HMA Construction Program

HMA Placement

Learning Objectives

- State the Objectives of HMA Placement
- Identify Components and Function – Tractor and Screed Unit
- Describe Operational Principles of Screed
- Describe Grade and Slope Control Systems
  - Types
  - Functions
  - Capabilities

Learning Objectives

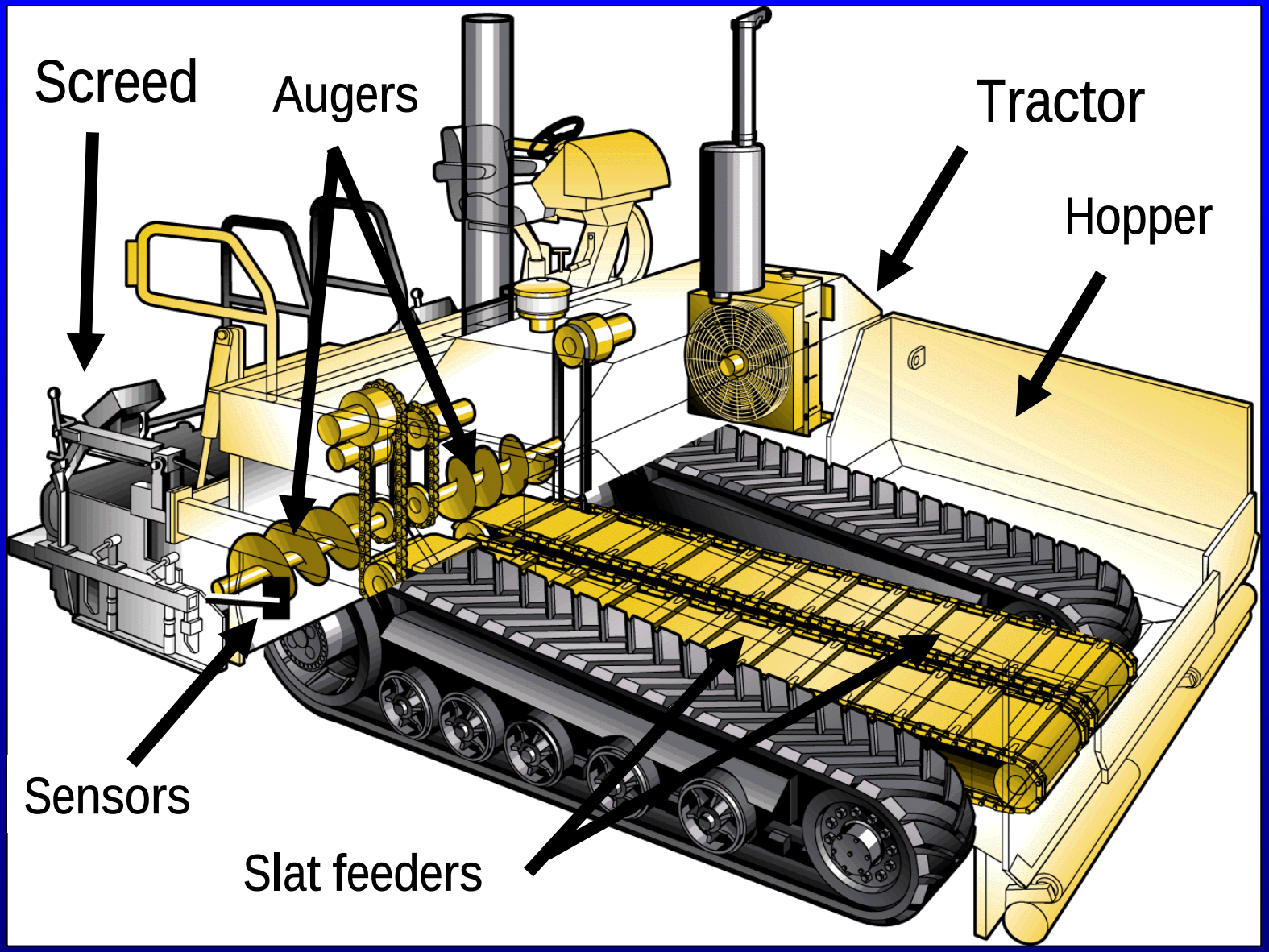
- Describe the Types of Paving and When to Use Them
- Describe Proper Paver Maintenance
- Describe Proper Operating Techniques

Tractor Unit

- Drive Systems
- Push Rollers and Truck Hitches
- Hopper
- Slat Conveyer

Tractor Unit

- Conveyer Flow Gates
- Augers
- Materials Feed System
- Tow Points
- Maintenance



Courtesy of Caterpillar Paving Products

Tractor Unit

Courtesy of Caterpillar Paving Products

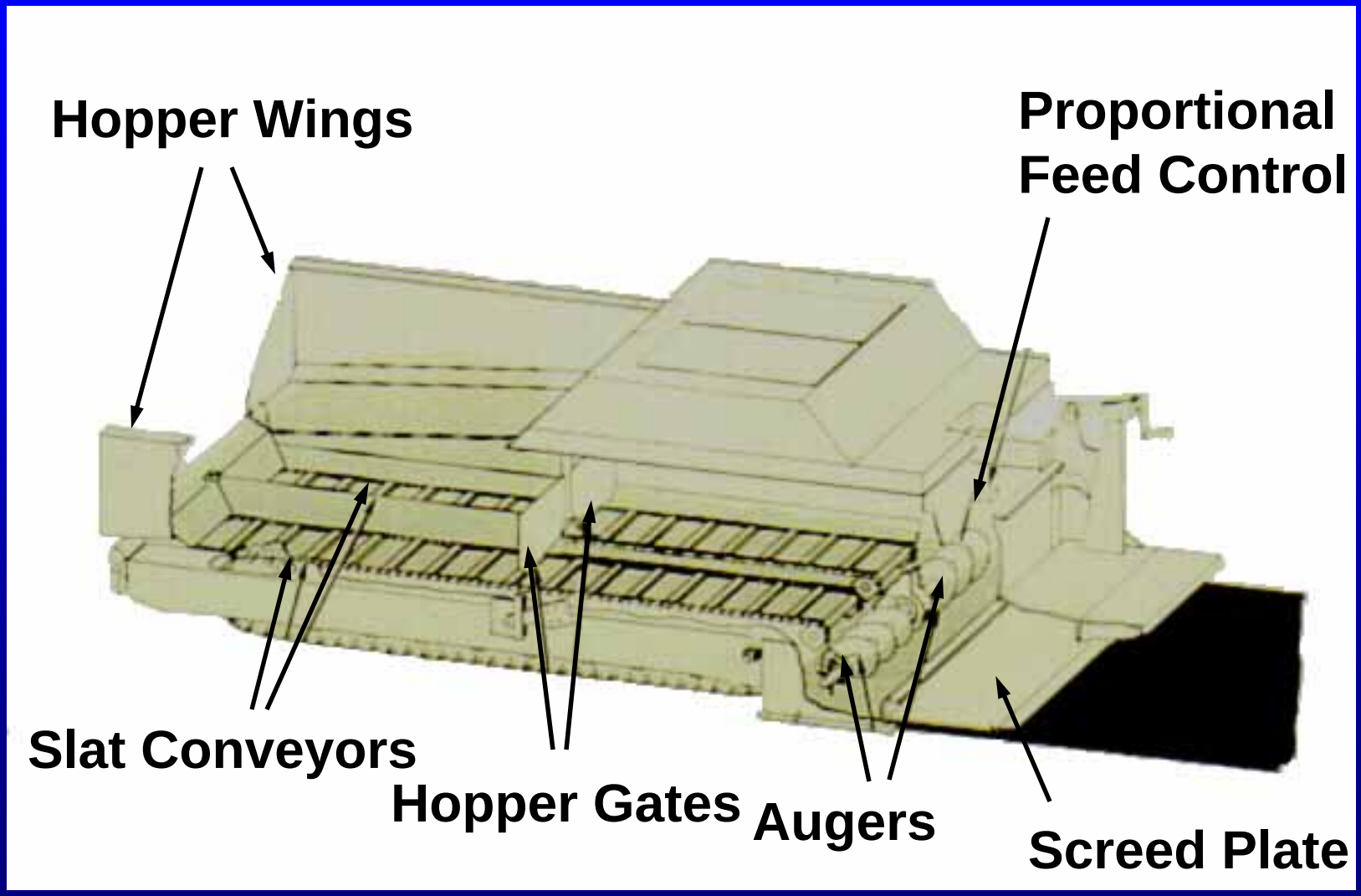
Track Drive

Courtesy of Caterpillar Paving Products

Truck Hitch

Push Rollers With Truck Hitch

Material Flow

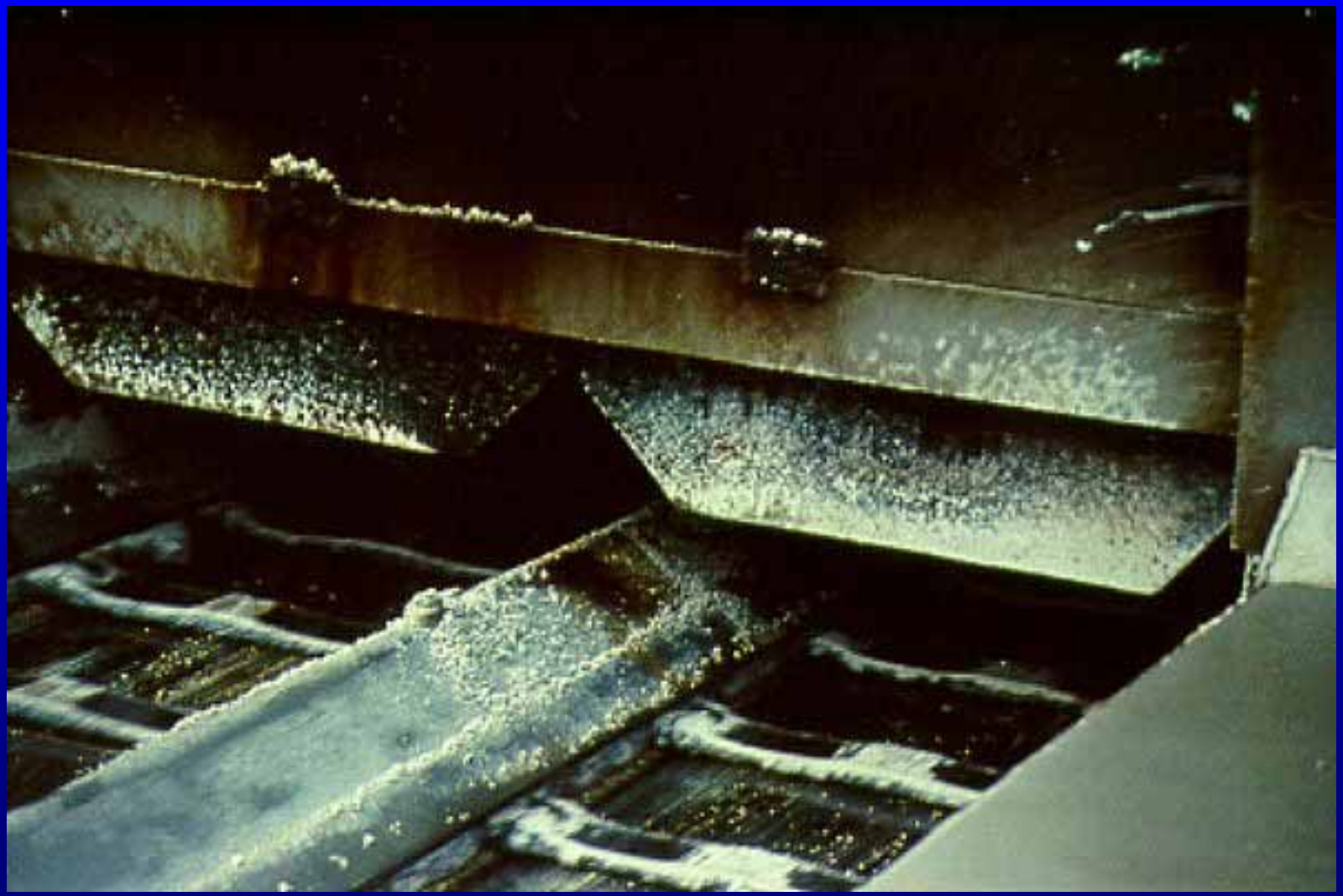


Paver Hopper

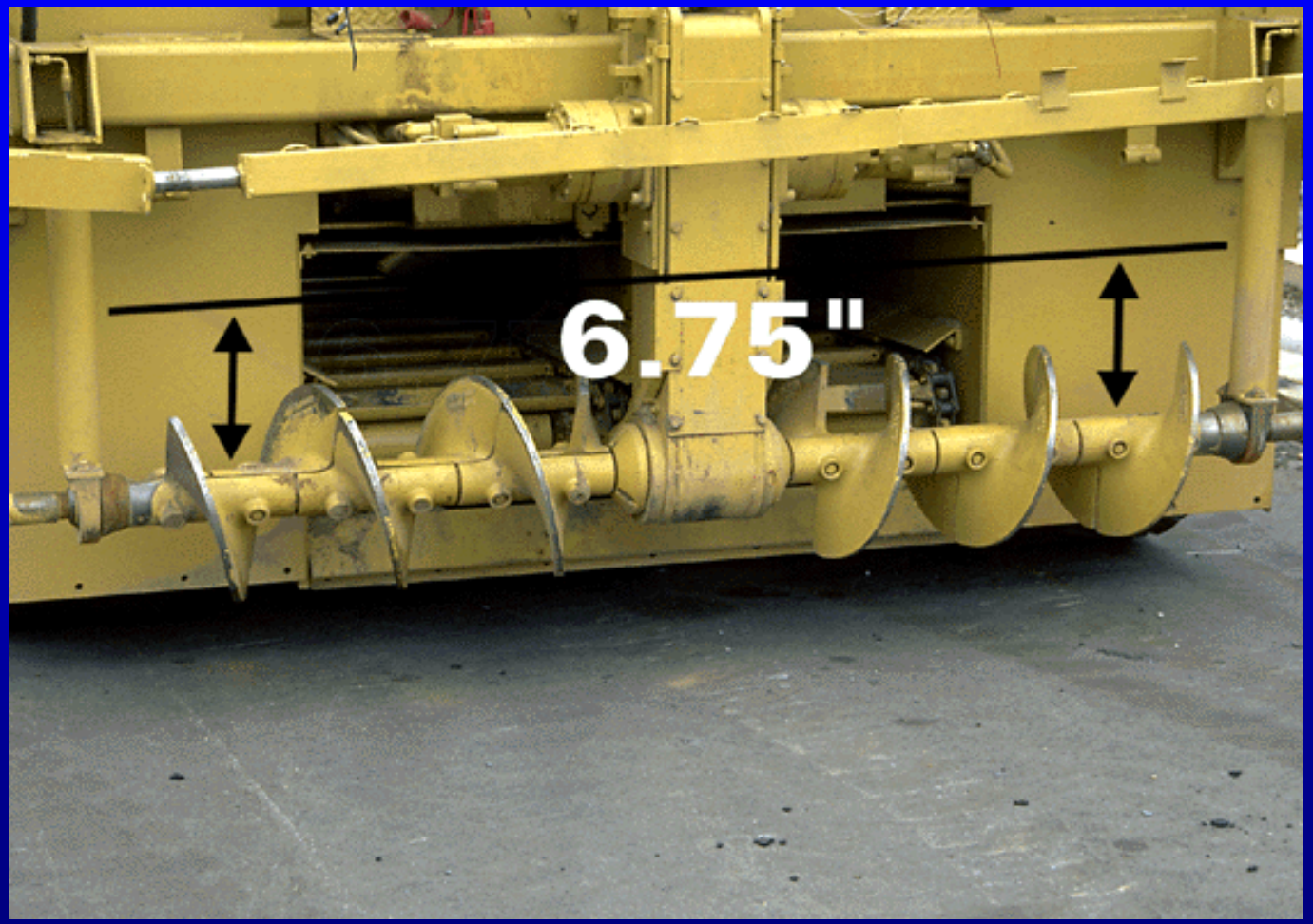
Overflow Flashing

Slat Conveyors

Flow Gates



Adjustable Screw Augers



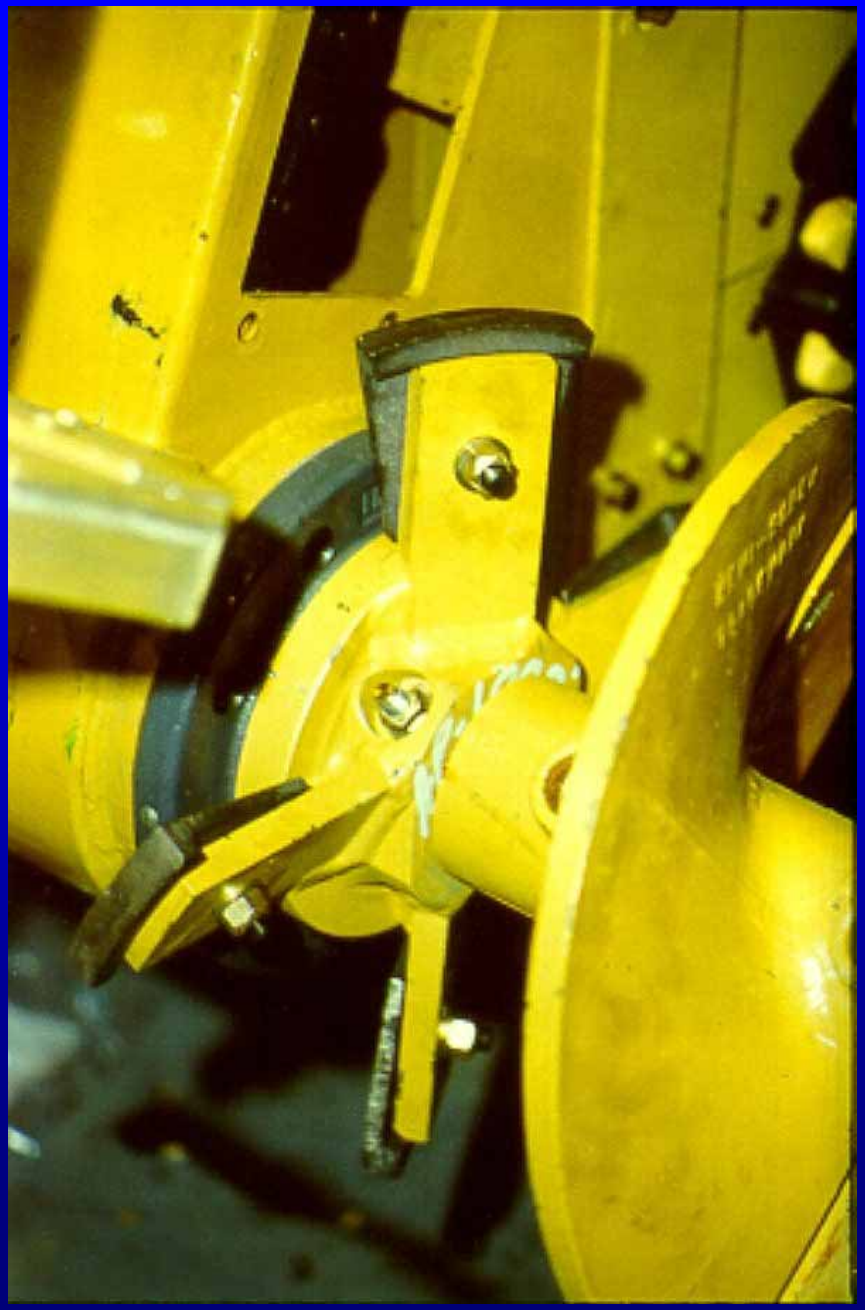
Courtesy of Caterpillar Paving Products

Adjustable Screw Augers

- Auger height affects mat texture
- Auger height 51 mm (2”) above mat is right for most mixes
- Fine tune according to mix

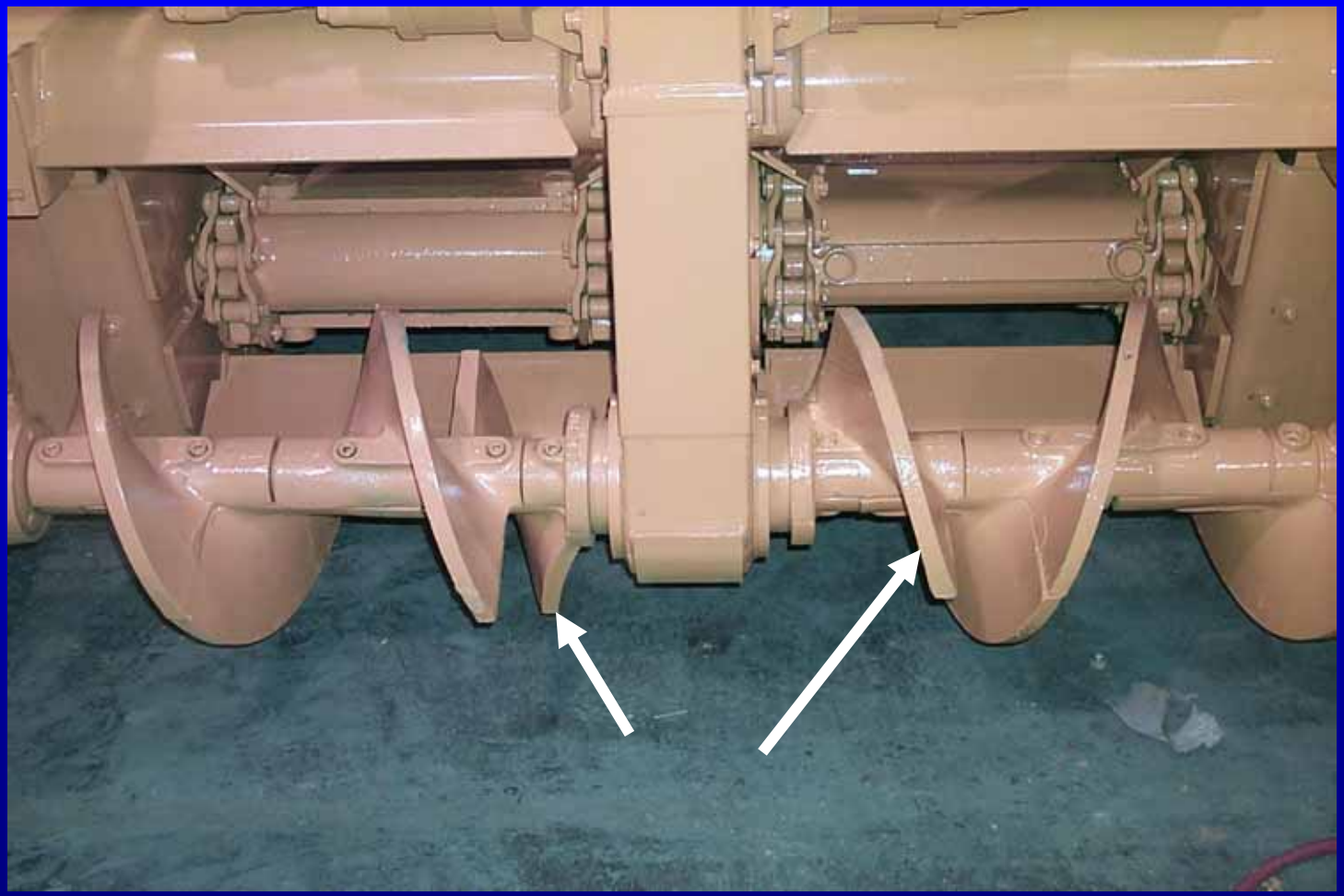
Proper Head of Material

Courtesy of Caterpillar Paving Products



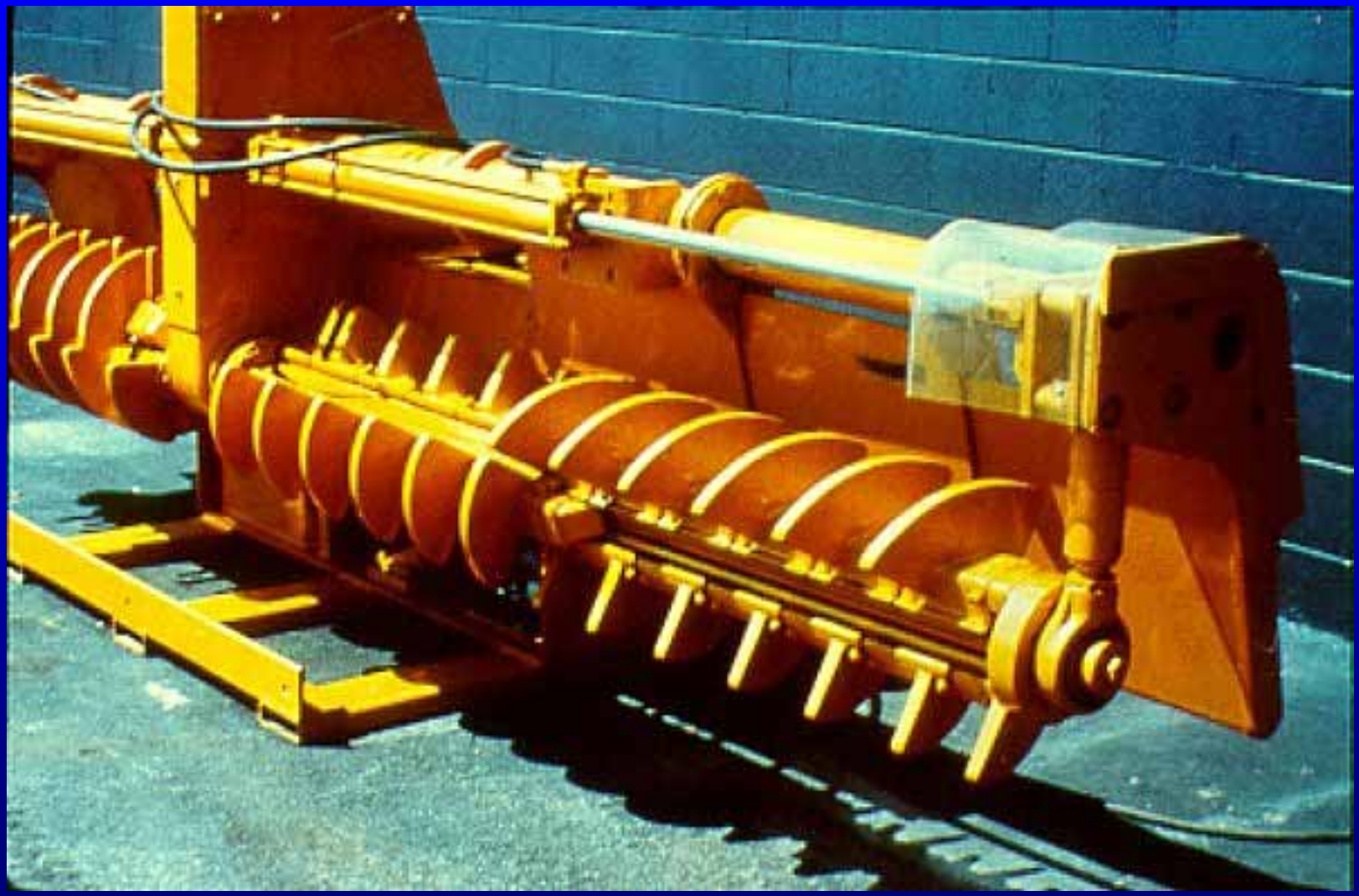
Kick Back Paddles

Kick Back Flights

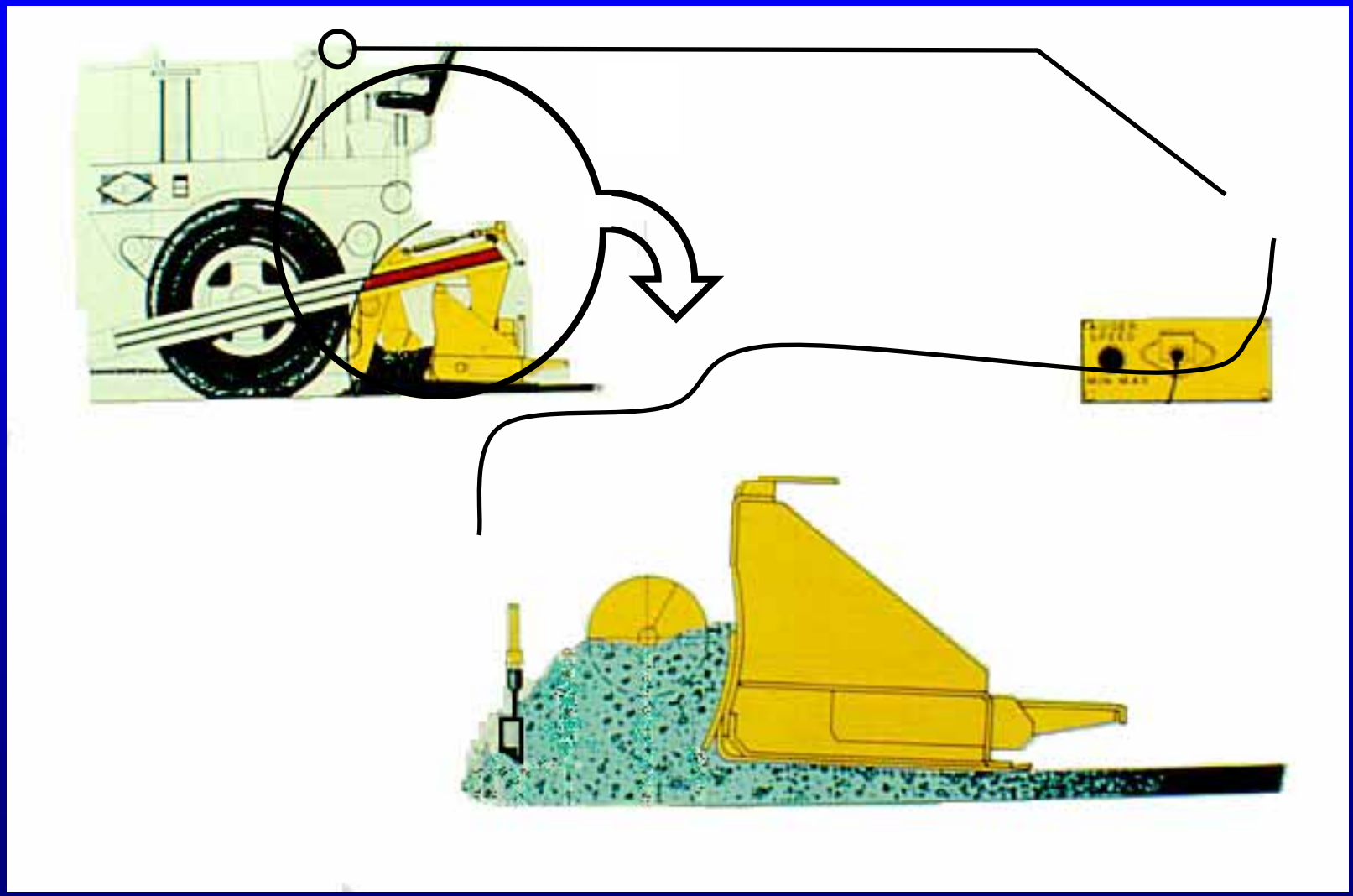


Courtesy of Caterpillar Paving Products

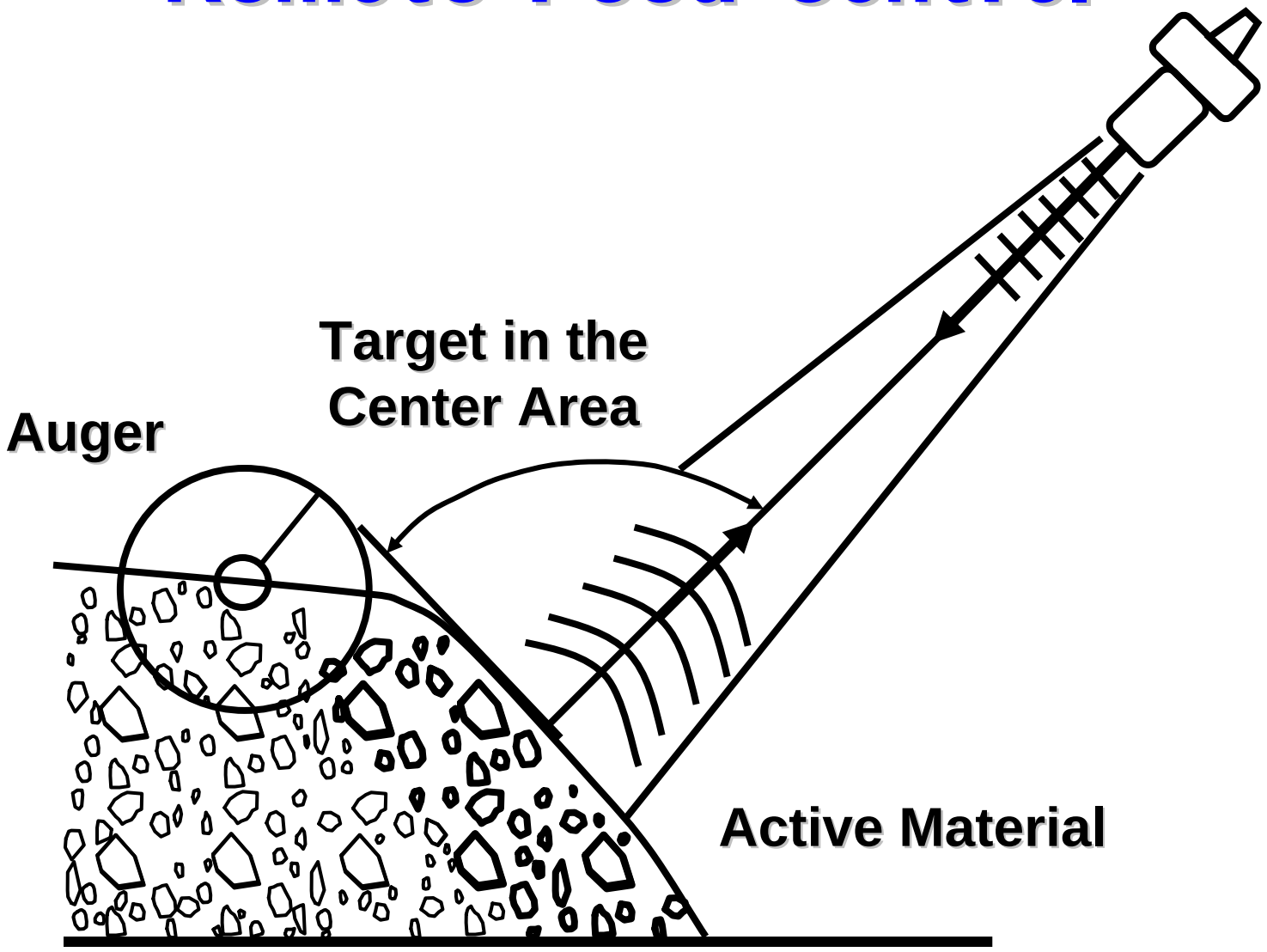
Extendable Augers



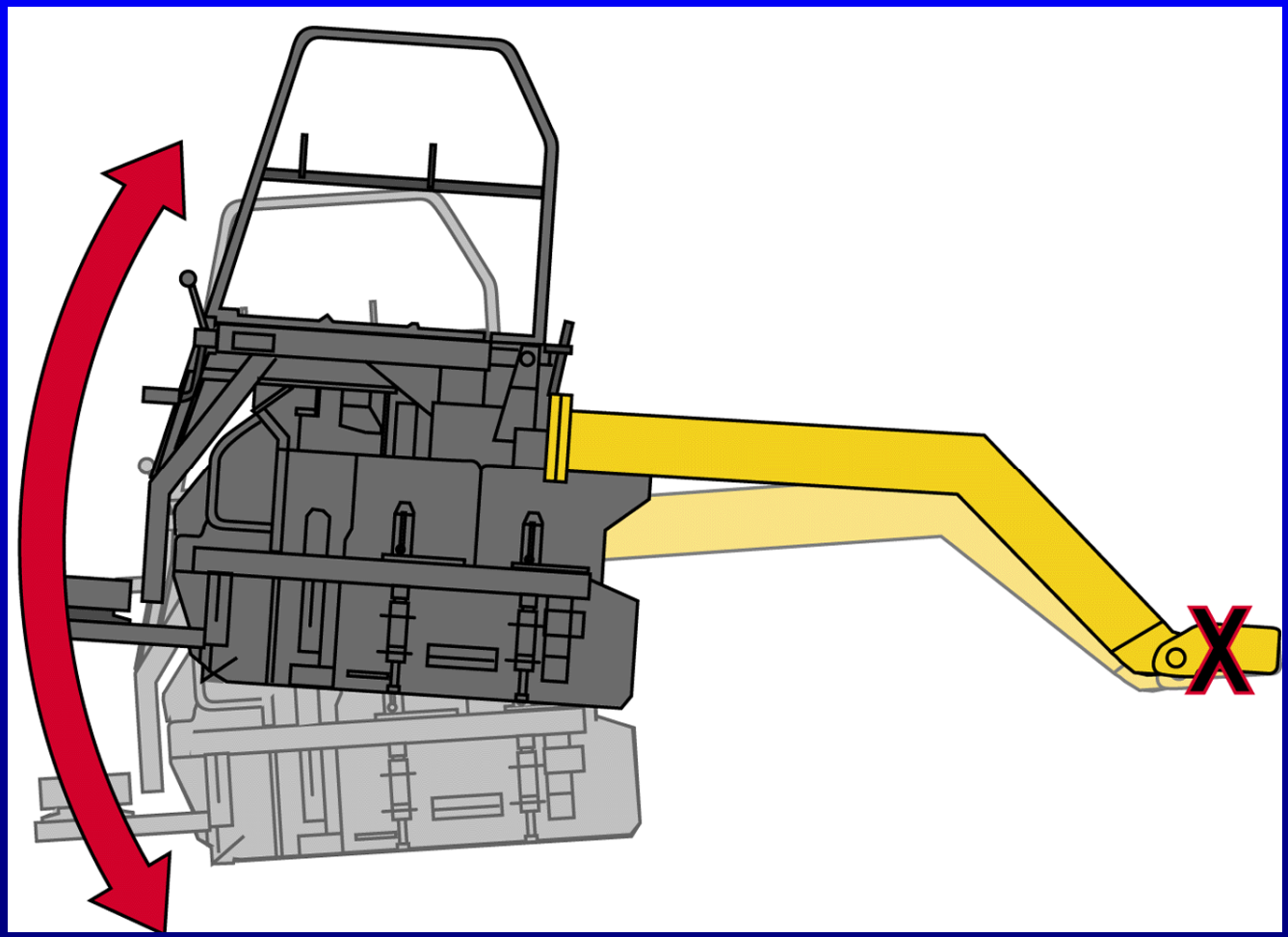
Feed Control Sensors



Remote Feed Control



Tow Point



Courtesy of Caterpillar Paving Products

Screed Unit

- Screed plate
- Strike-off
- Crown control
- Extensions and end plates

Screed Unit

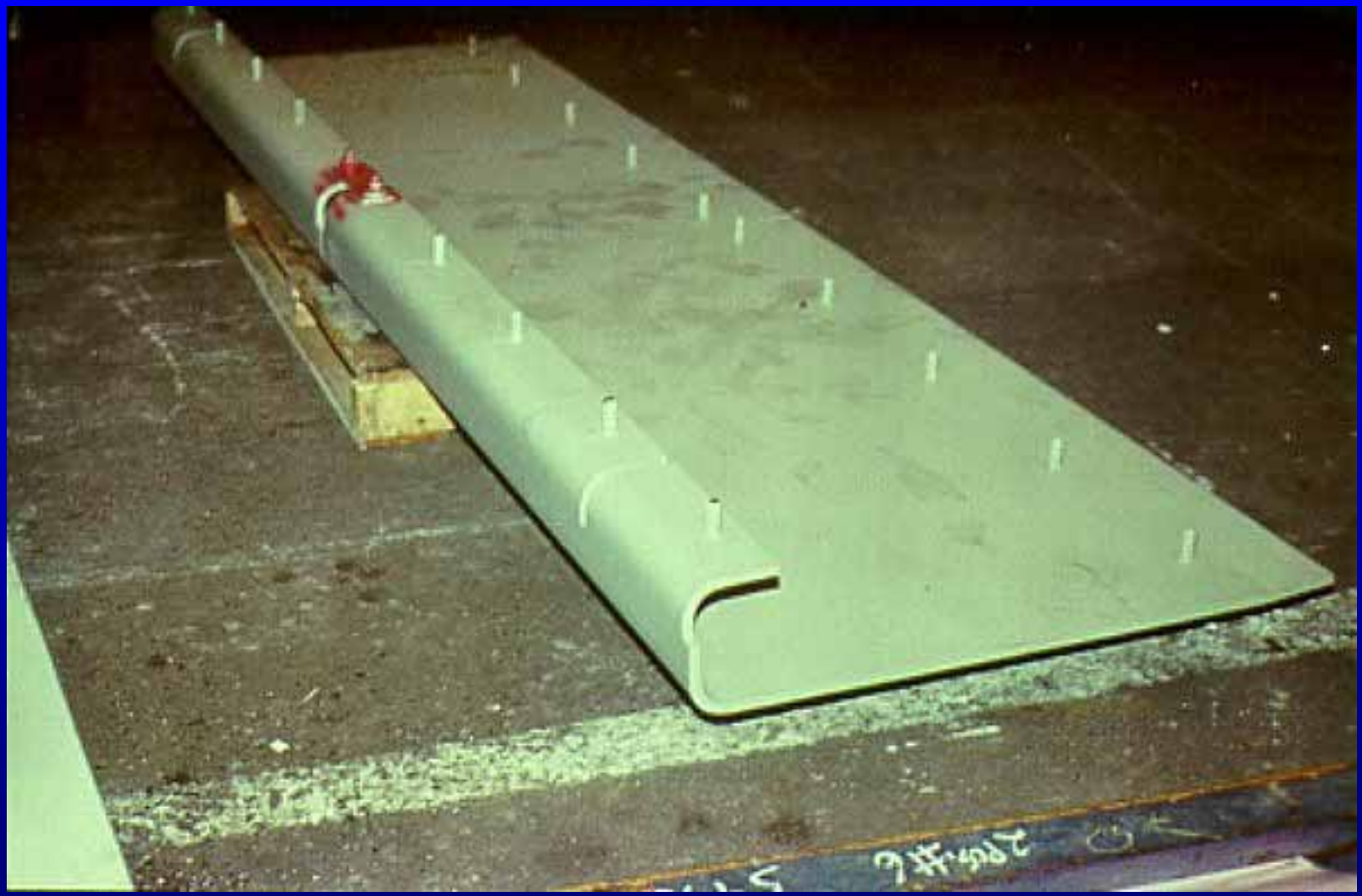
- Thickness Control Screws
- Screed Arm
- Pre-Compaction System
- Heating Systems
- Maintenance

Screed Unit

Blaw-Knox

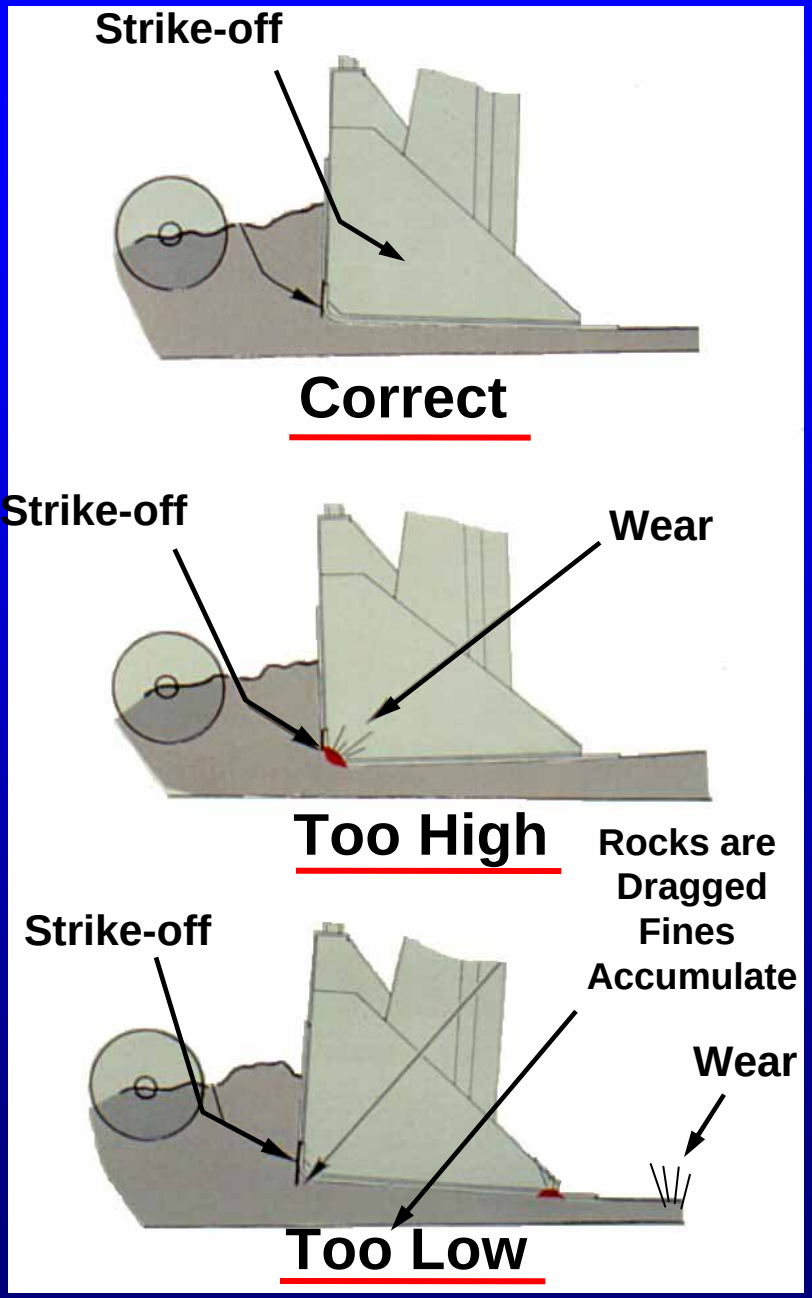
Courtesy of Blaw-Knox Ingersoll Rand Paving Products

Screed Plate

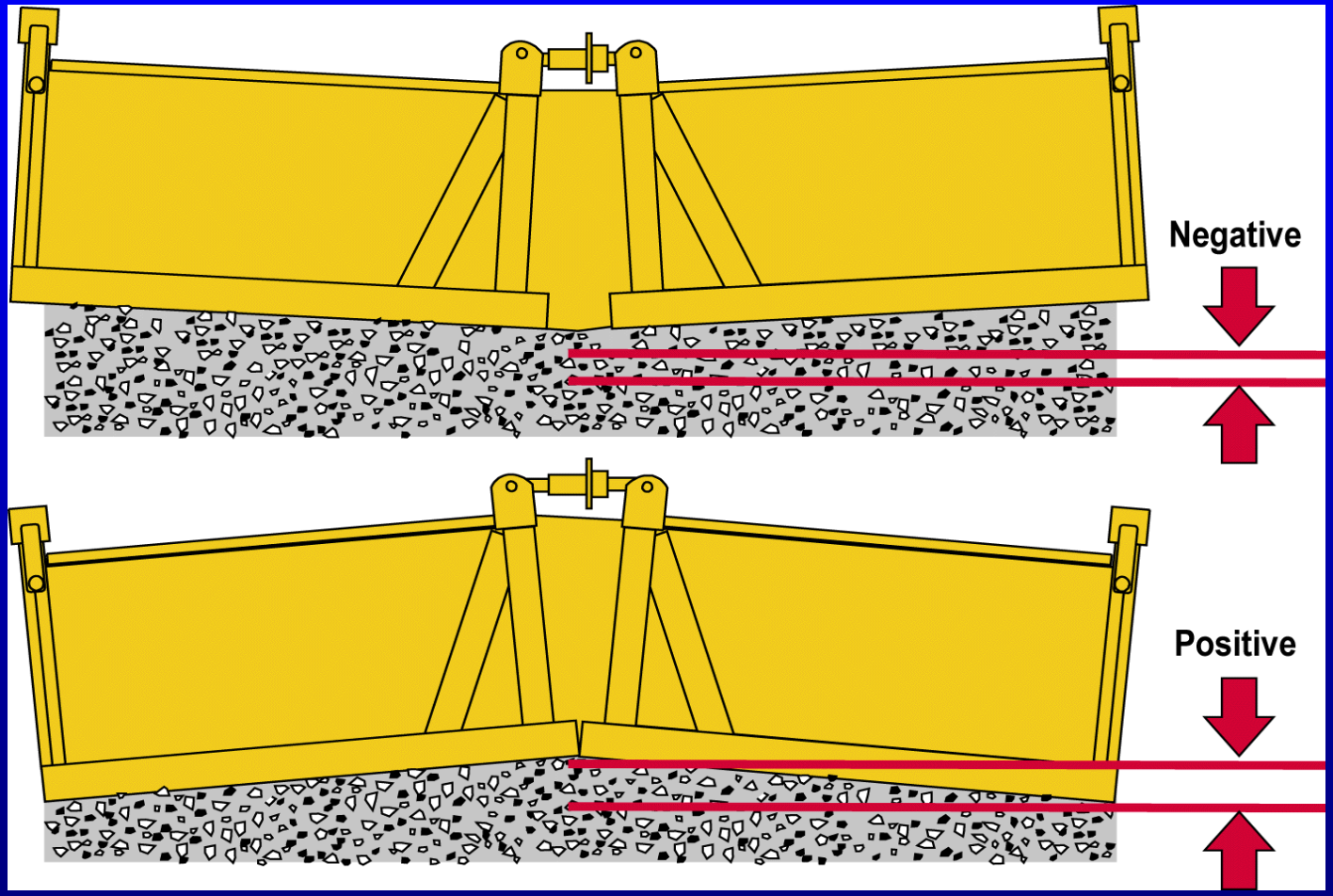


Screed Plate

Strike-off Plate Adjustment

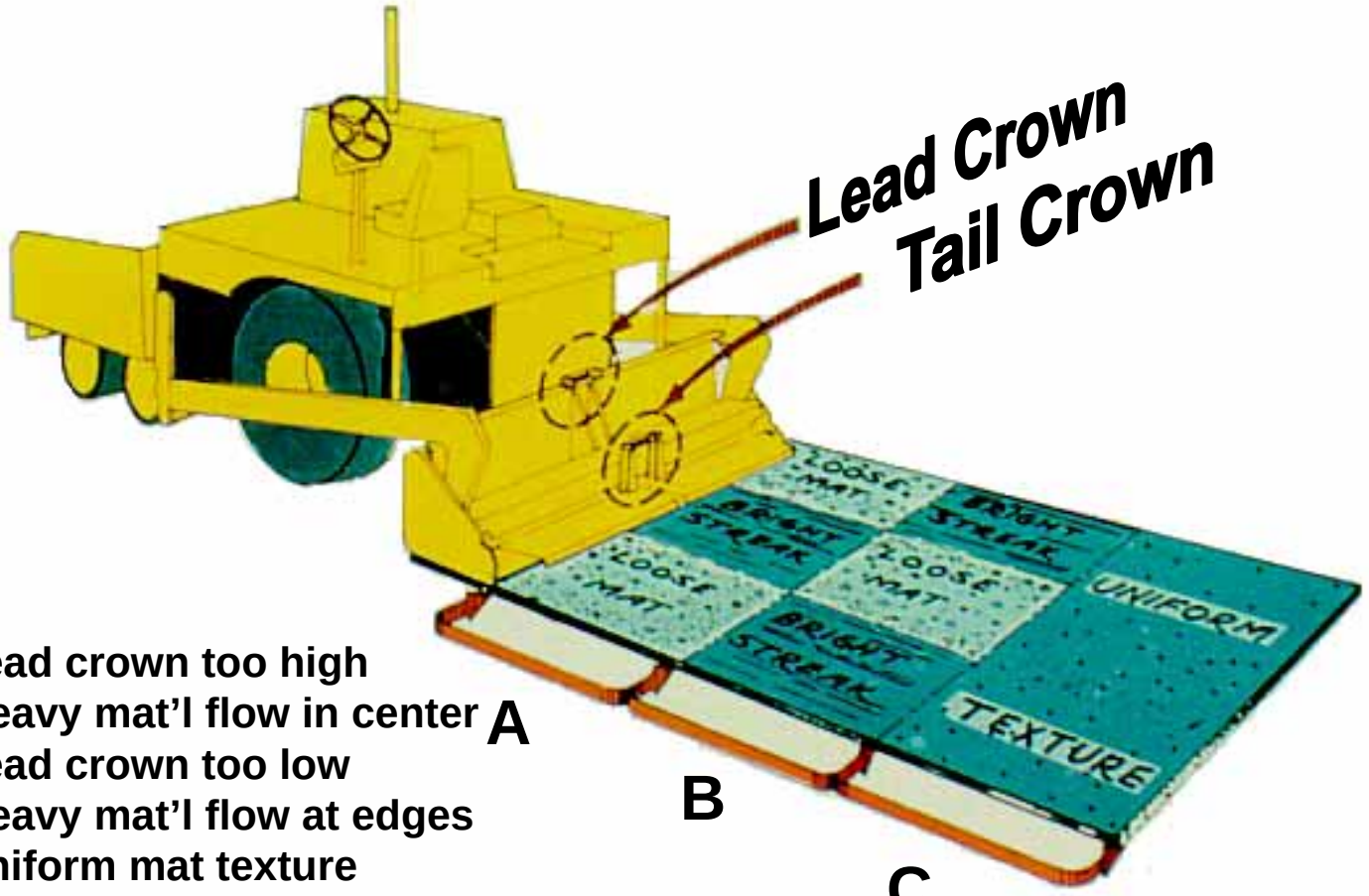


Screed Plate Crown Adjustment



Courtesy of Caterpillar Paving Products

Crown Adjustment



A - Lead crown too high
Heavy mat'l flow in center

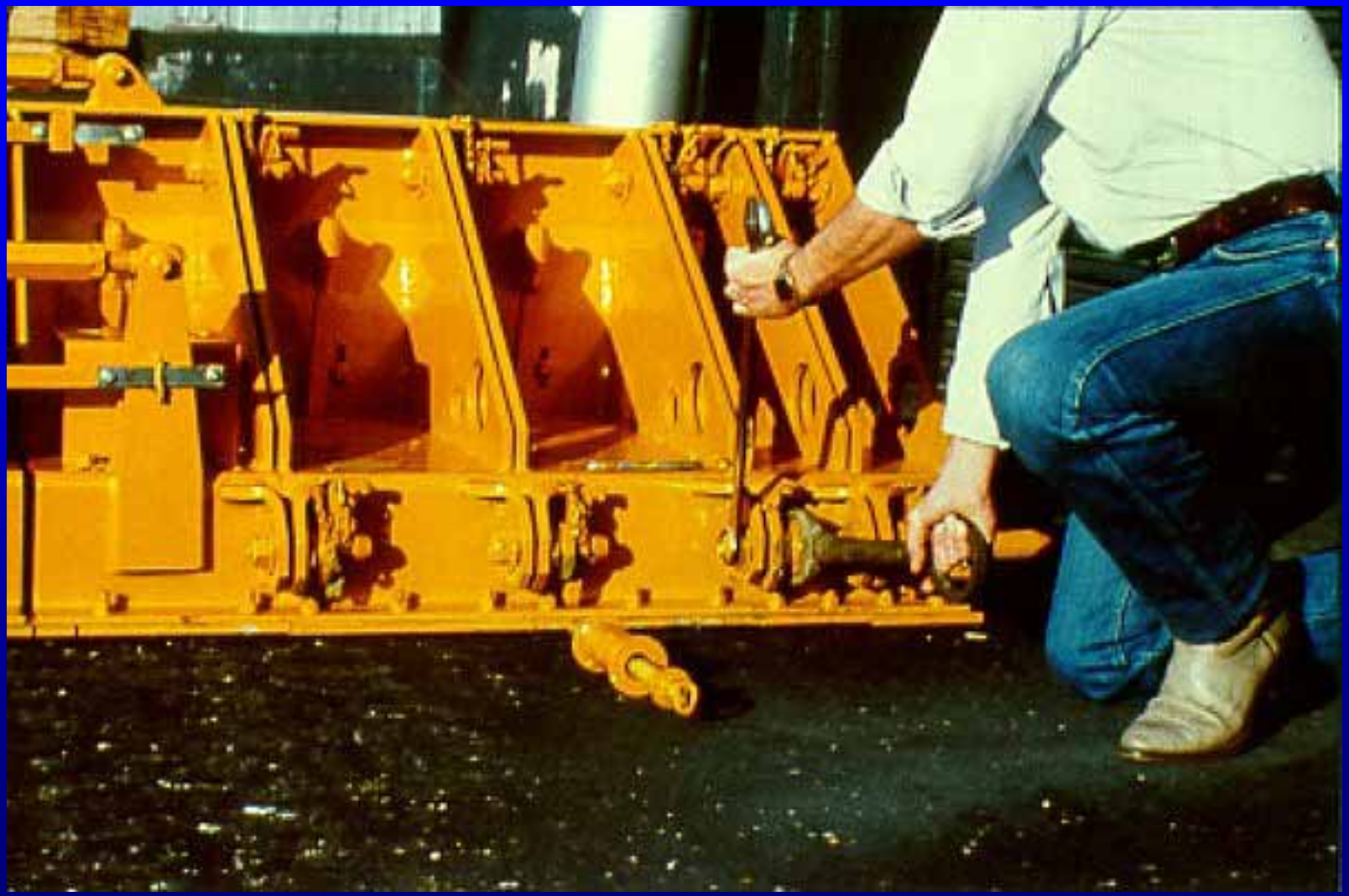
B - Lead crown too low
Heavy mat'l flow at edges

C - Uniform mat texture
and material flow from
correct crown adjustment

Hydraulic Screed Extenstion

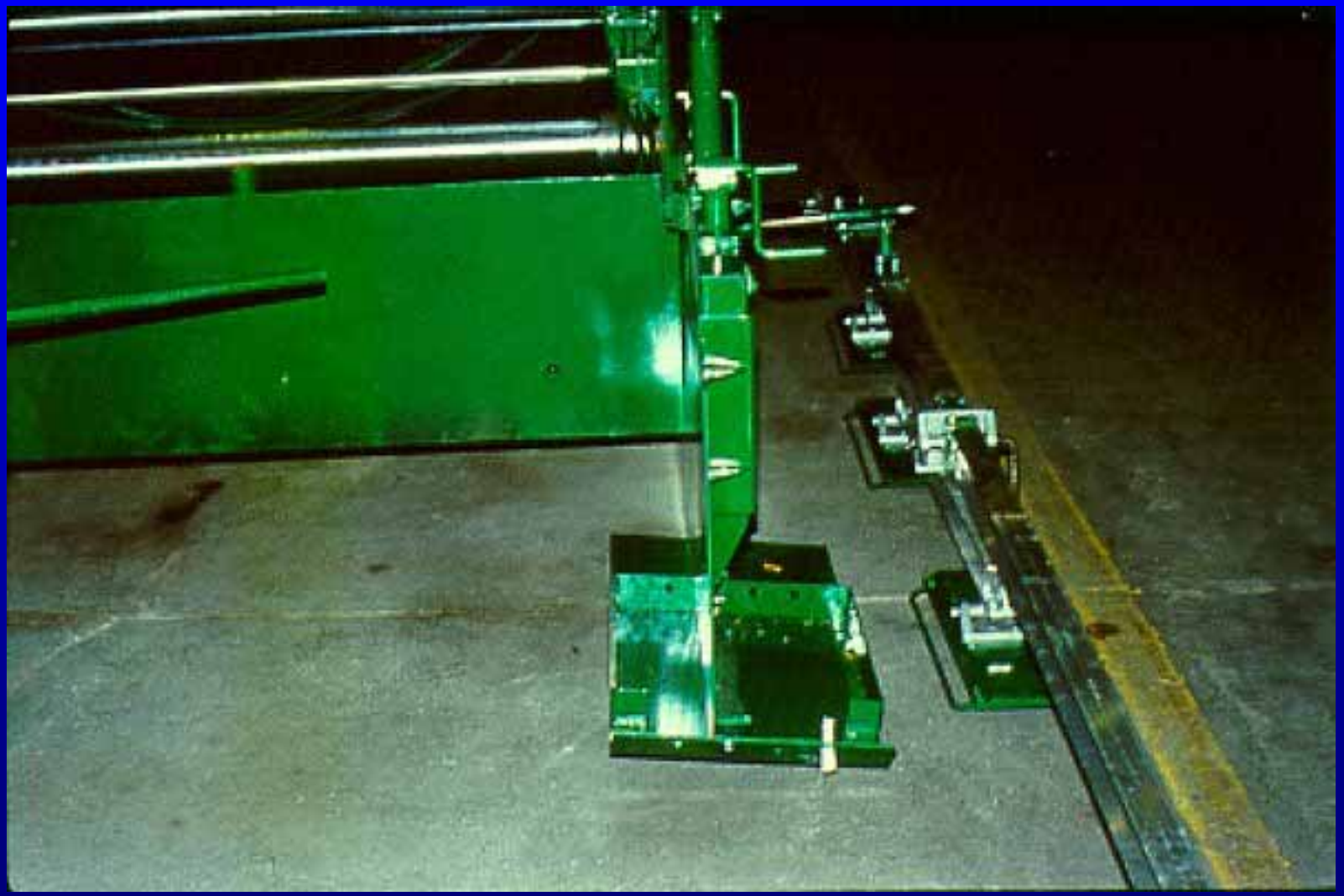
Courtesy of Caterpillar Paving Products

Mechanical Screed Extenstion



Screed End Plate

Cut-off Shoes



Thickness Control Screws

Courtesy of Blaw-Knox Ingersoll Rand Paving Products

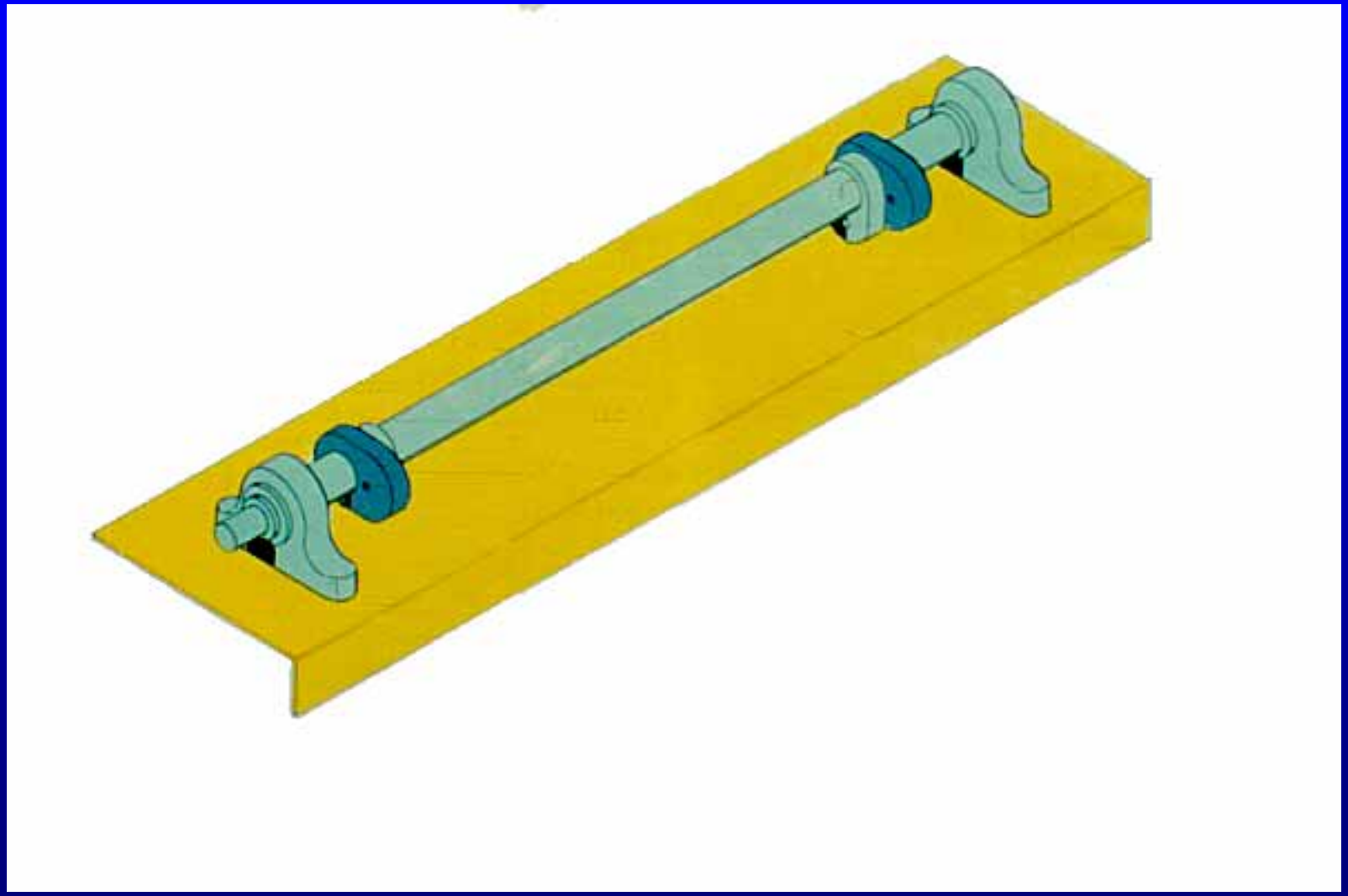
Thickness Adjustments

Adjustment Screw/Crank

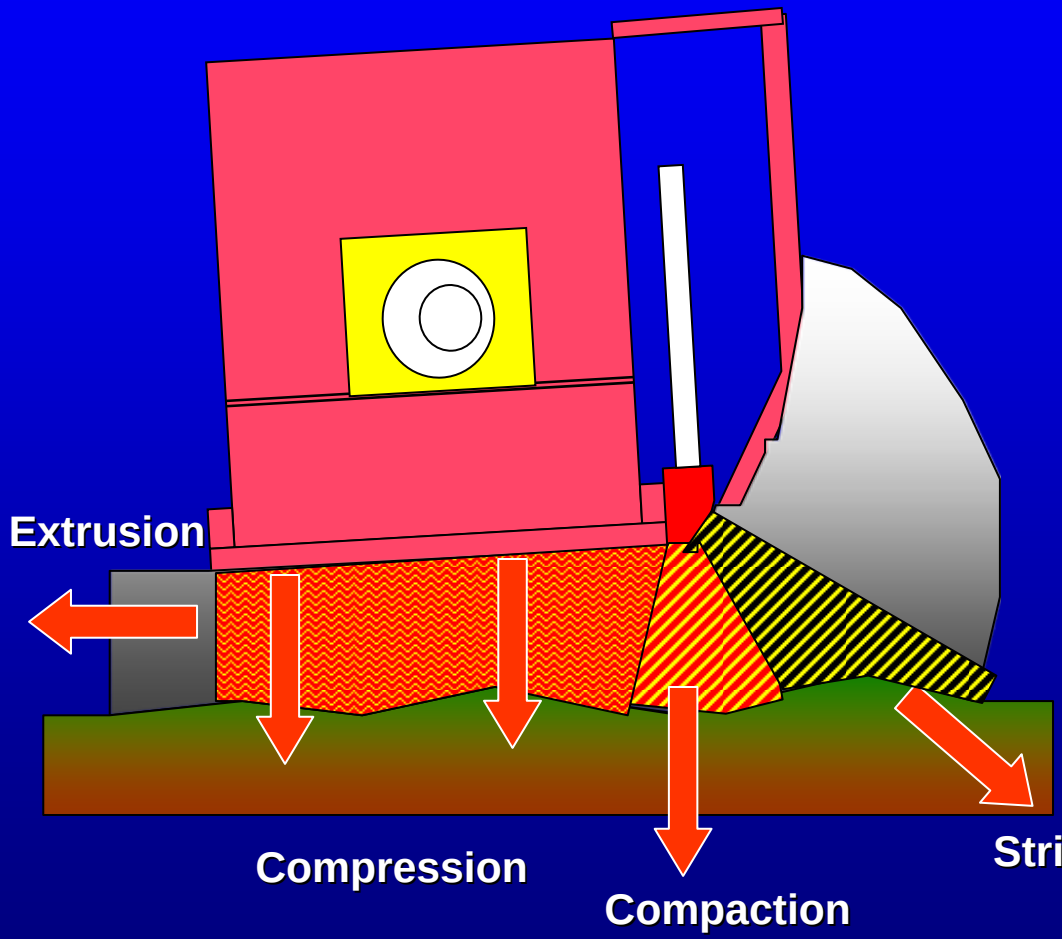
Adjustable Tow Point

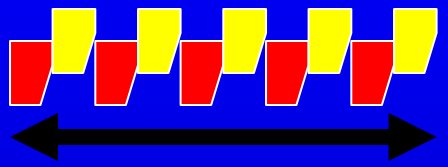
Courtesy of Caterpillar Paving Products

Screed Vibrators



VIBRATOR RPM & STROKE (AMPLITUDE)



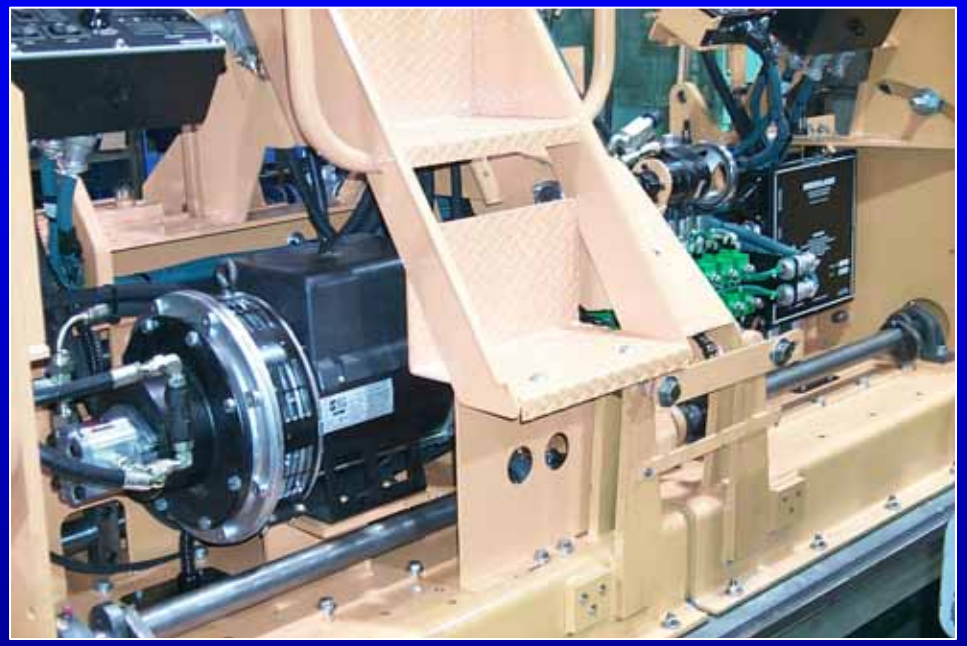


FEWER IMPACTS PER METER = LESS COMPACTION

MORE IMPACTS PER METER = INCREASED COMPACTION

Screed Heaters

Diesel System

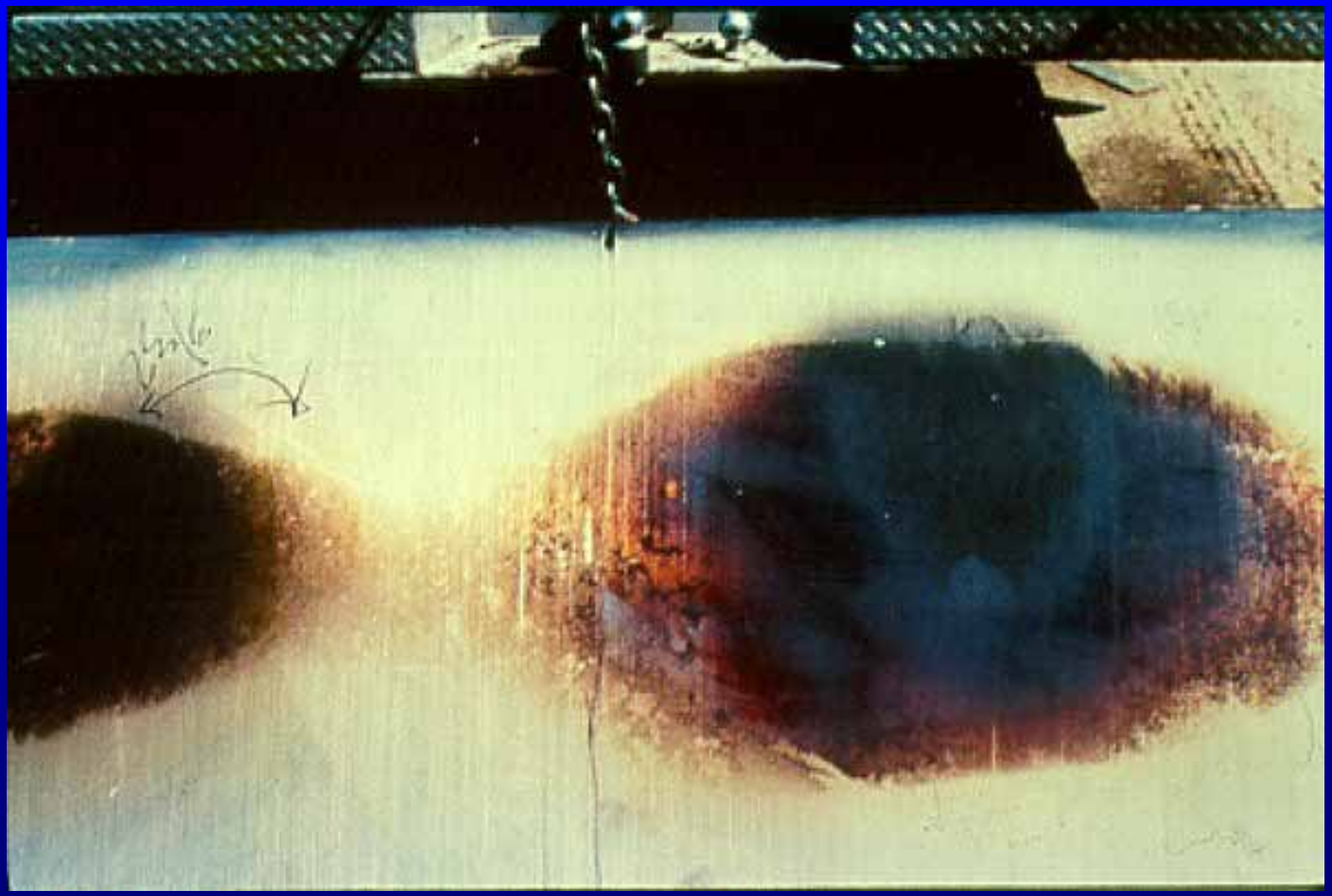


Electric System

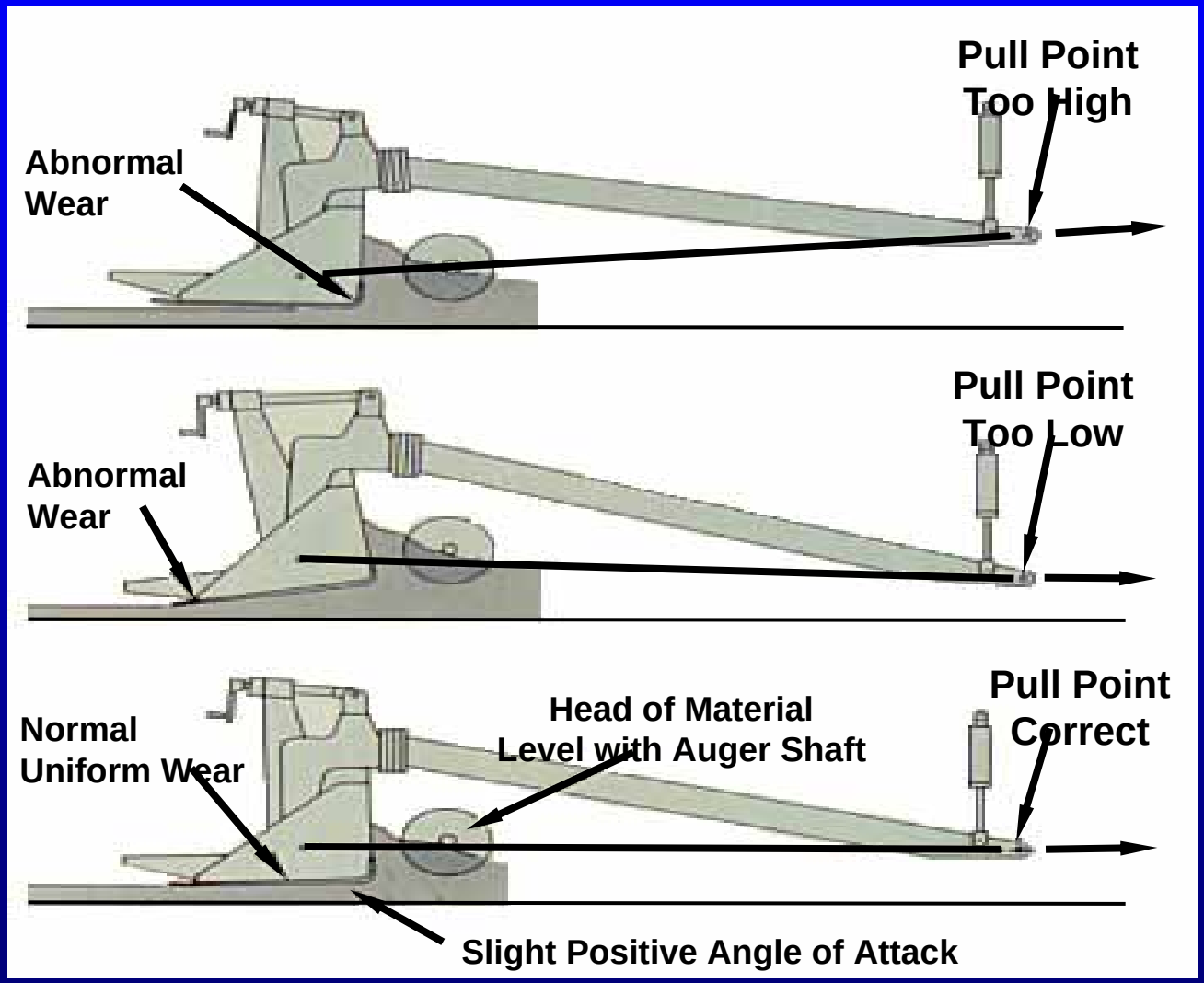
Blaw-Knox

Courtesy of Blaw-Knox Ingersoll Rand Paving Products

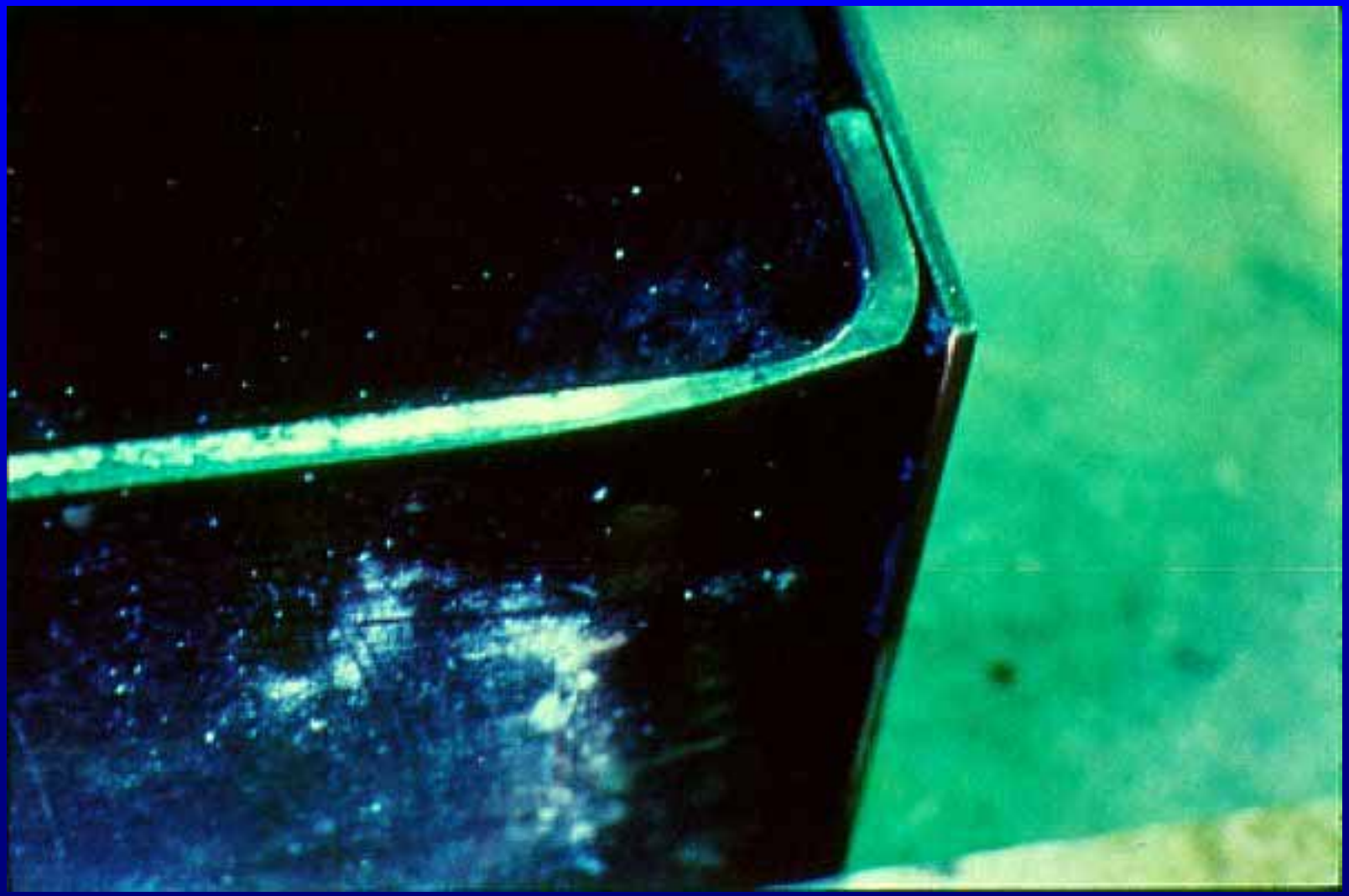
Damaged Screed Plate



Screed Setup



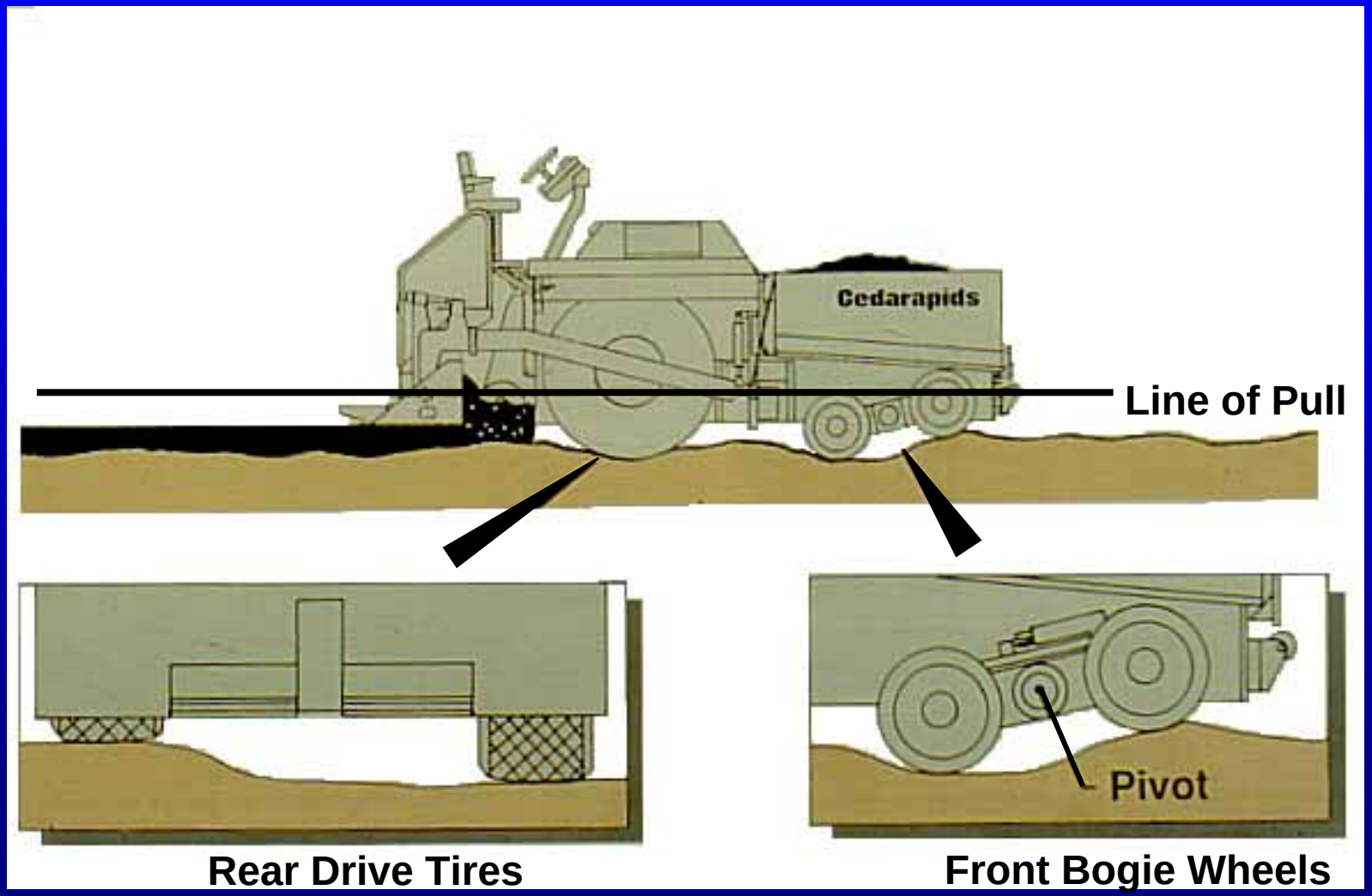
Uneven Screed Wear



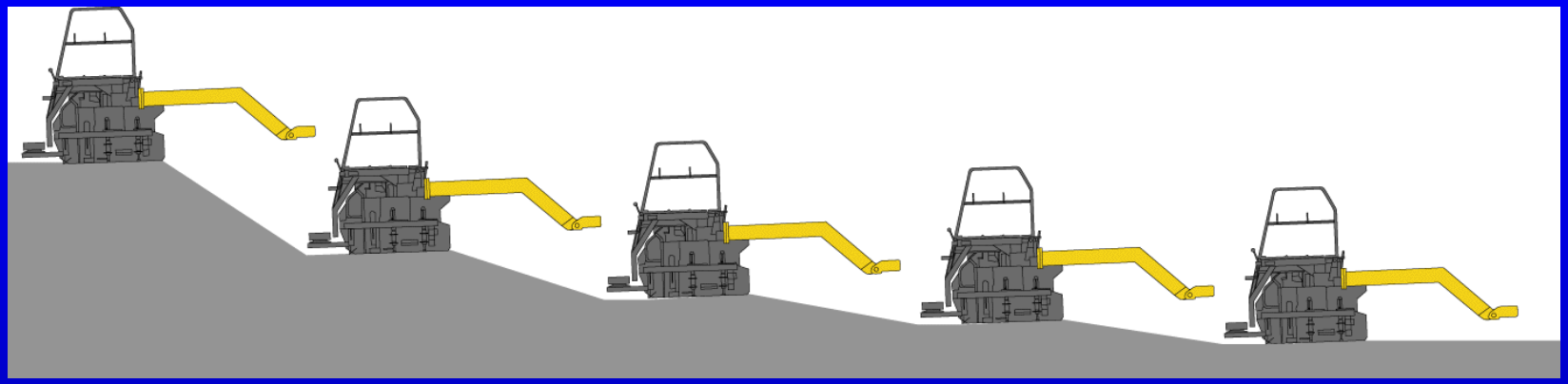
Operational Principles of the Screed

- Self-leveling Concepts
- Screed Response versus Distance
- Forces Acting on a Screed

Self Leveling - Rubber Tired Paver

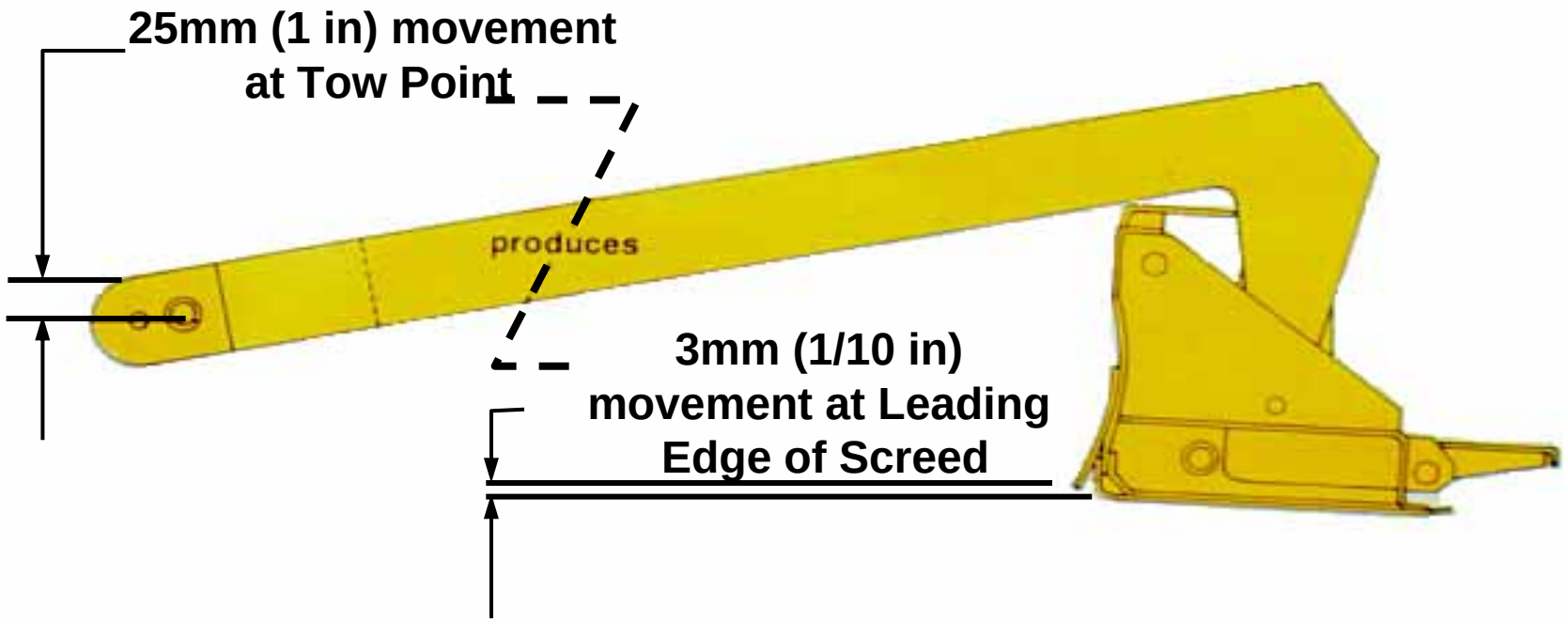


Screed Reaction Time



- Screed reacts to change in angle of attack over 5 tow arm lengths
- 65% of change occurs in the first tow arm length
- 35% of change occurs in the last 4 tow arm lengths

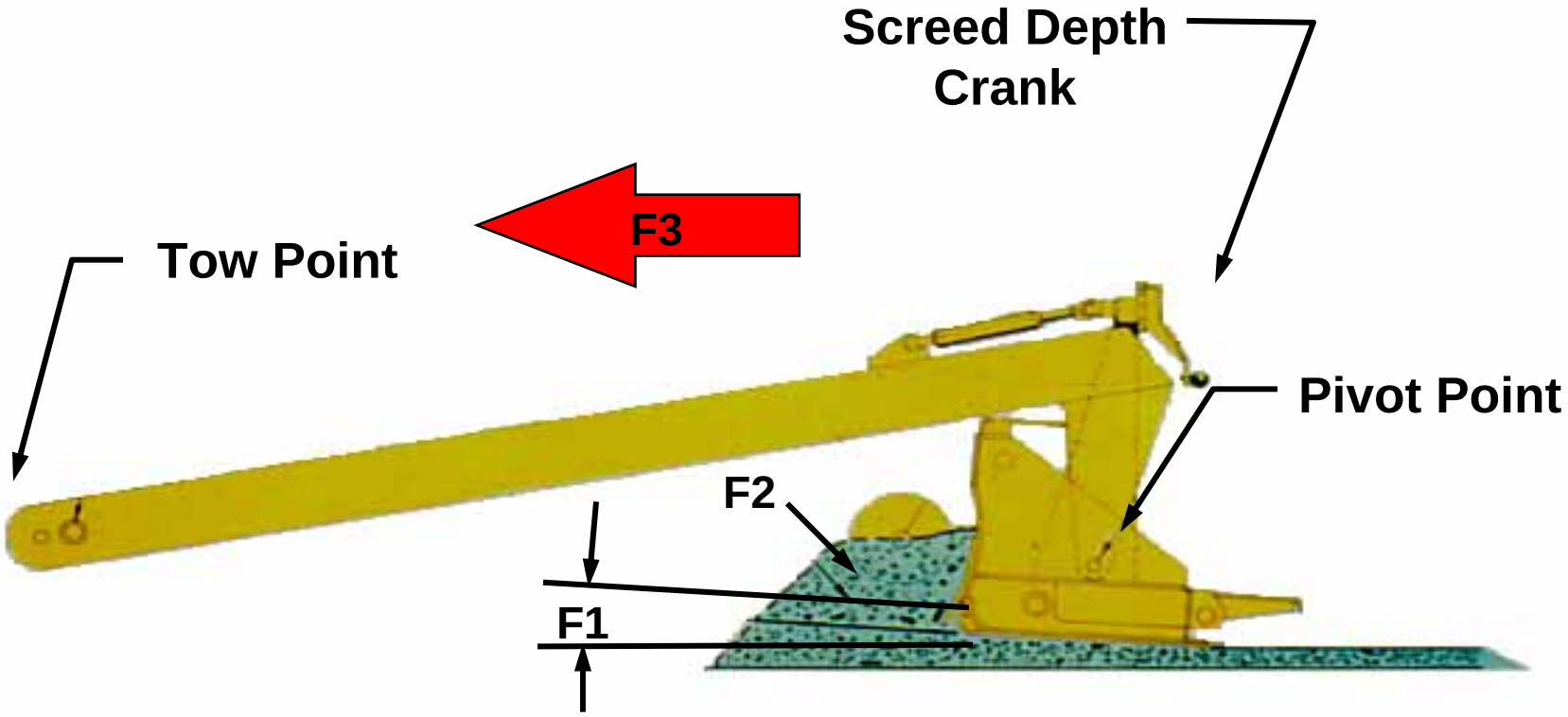
Tow Point Effects



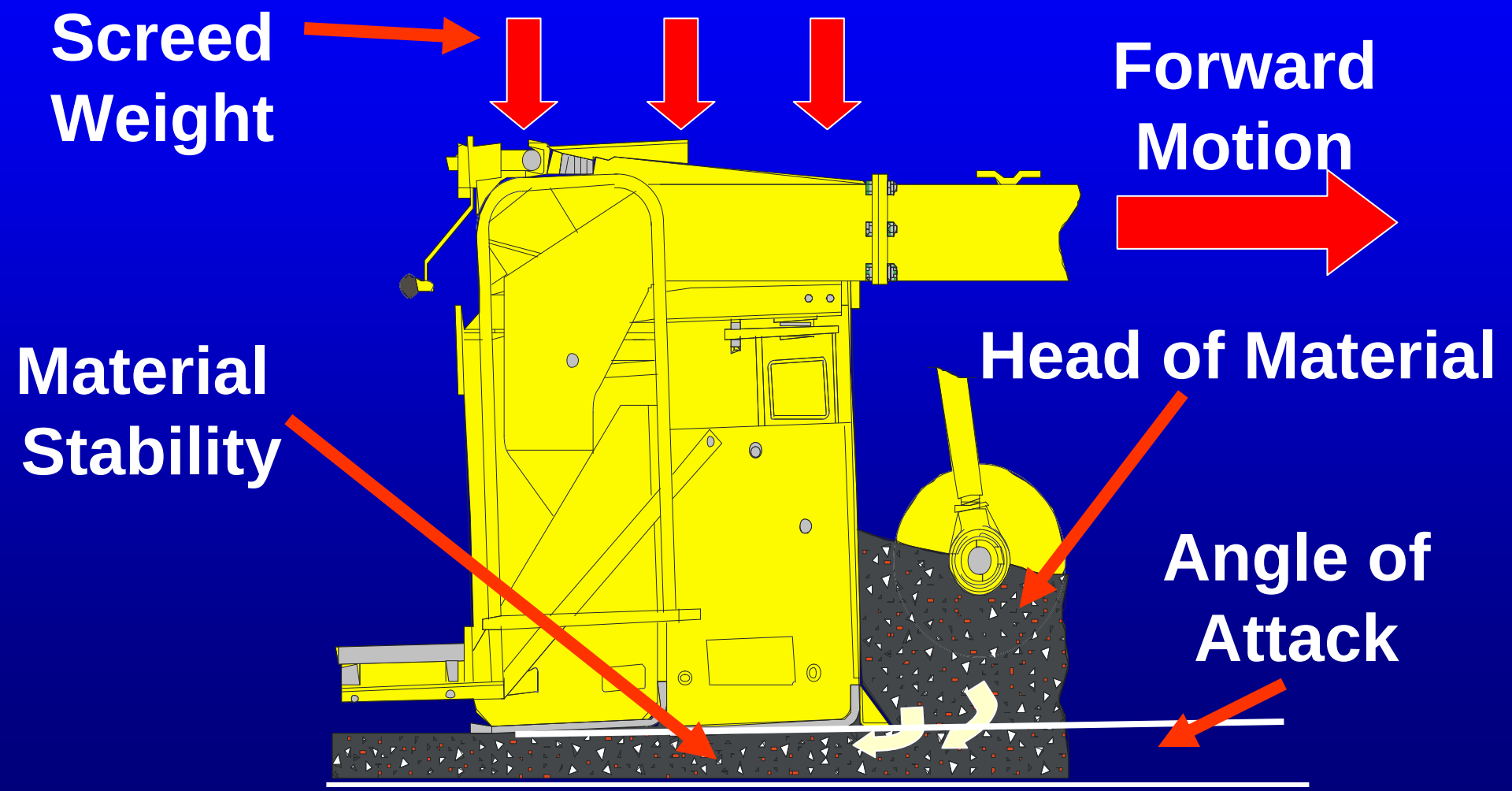
Main Forces Acting on Screed

1. Speed of Paver
2. Head of Material
3. Angle of Attack
4. Other Forces
   - Pre-compaction
   - Screed Weight

Screed Forces



Free Floating Screed



Blaw-Knox

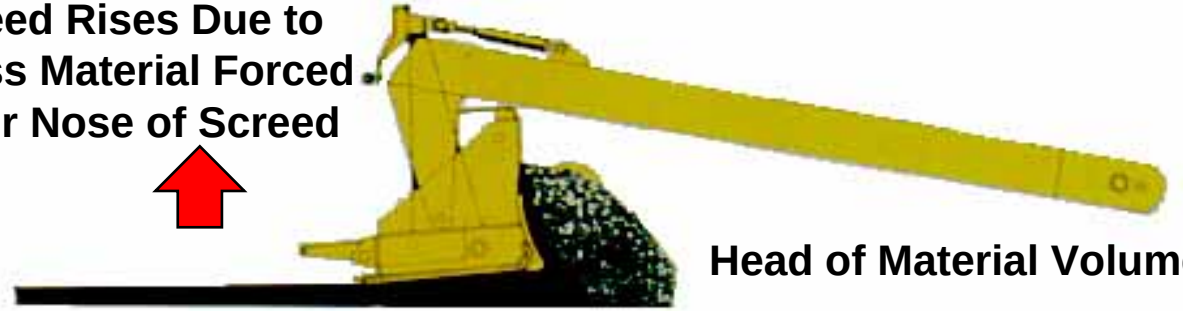
Courtesy of Blaw-Knox Ingersoll Rand Paving Products

Head of Material

Correct Depth of Mat Maintained

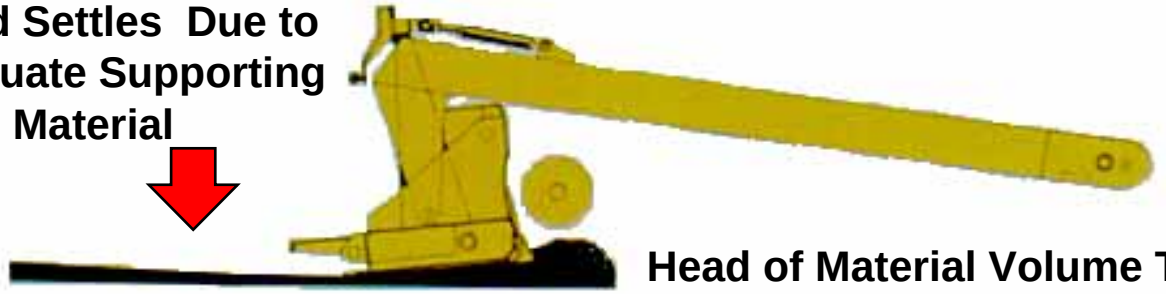
Constant Head of Material Volume

Screed Rises Due to Excess Material Forced Under Nose of Screed



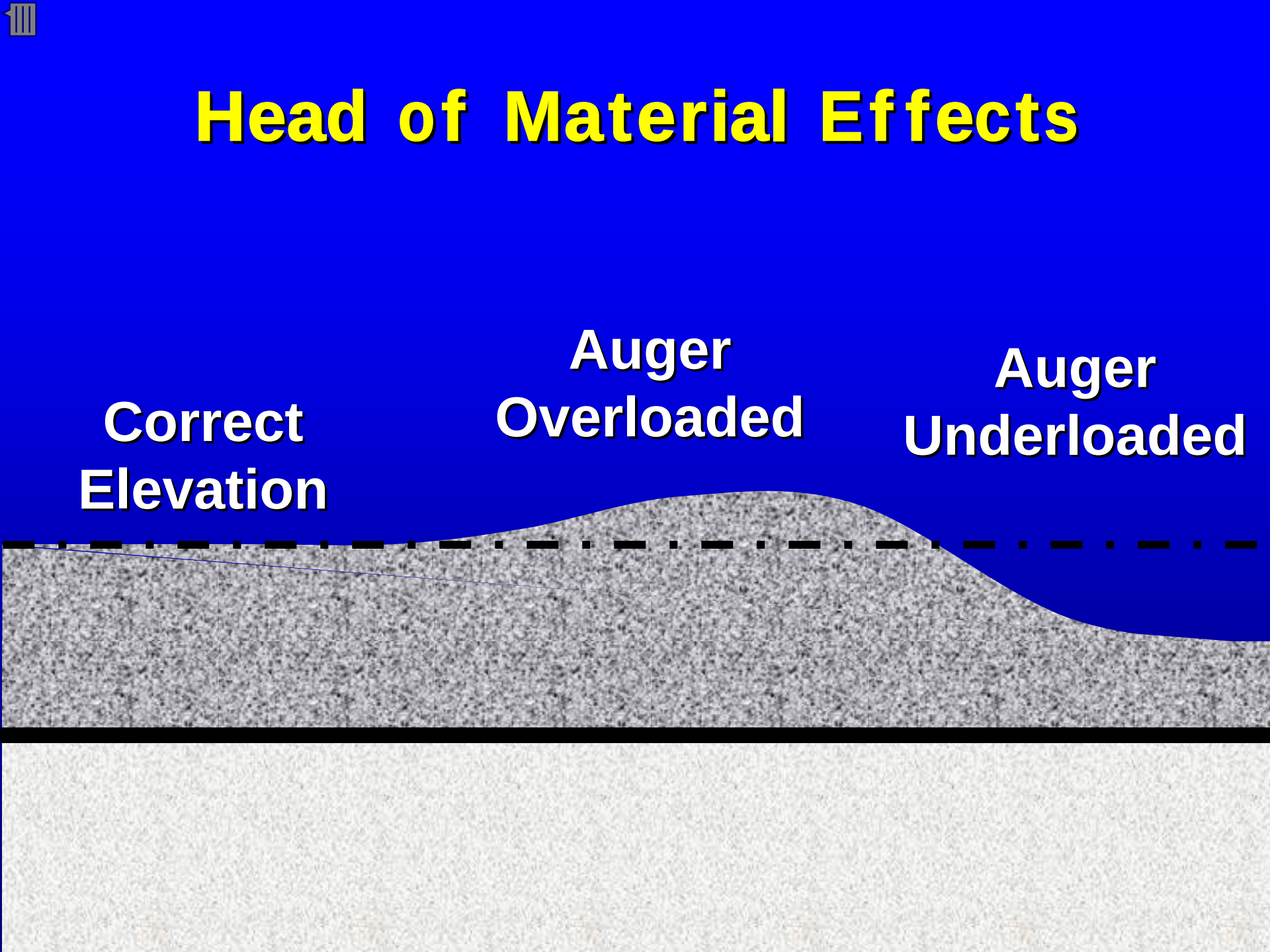
Head of Material Volume Too High

Screed Settles Due to Inadequate Supporting Material

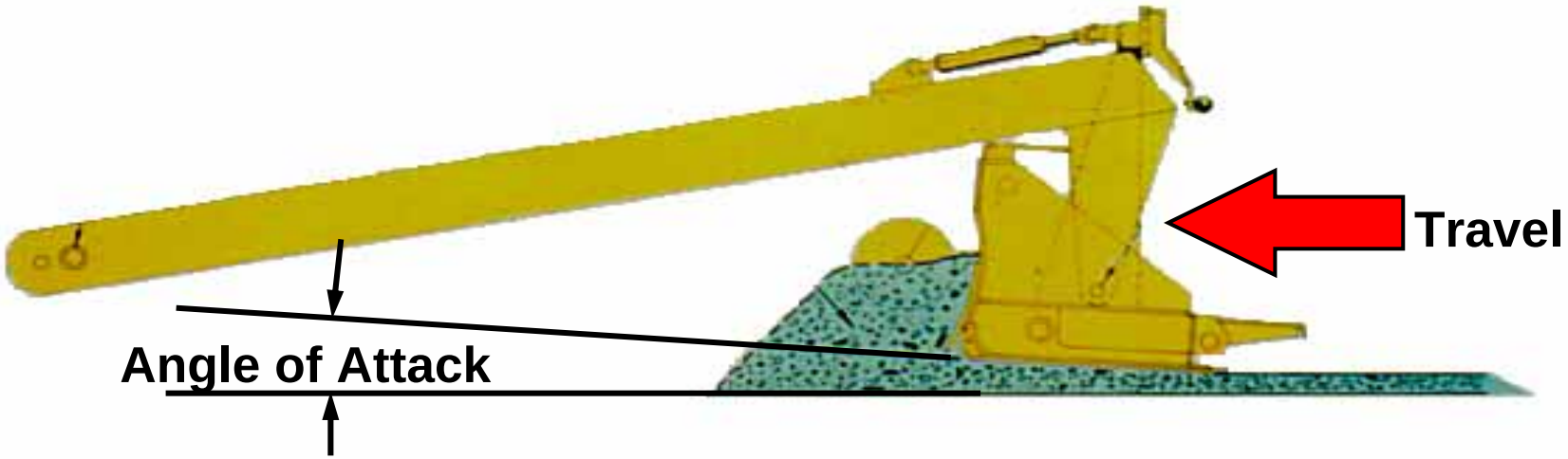


Head of Material Volume Too Low

Head of Material Effects

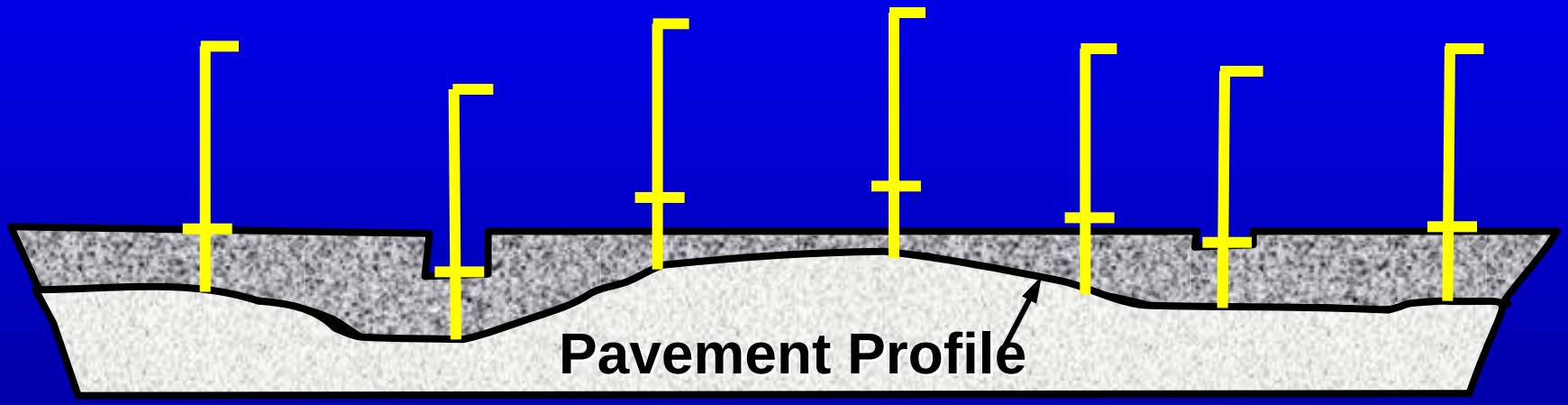


Angle of Attack



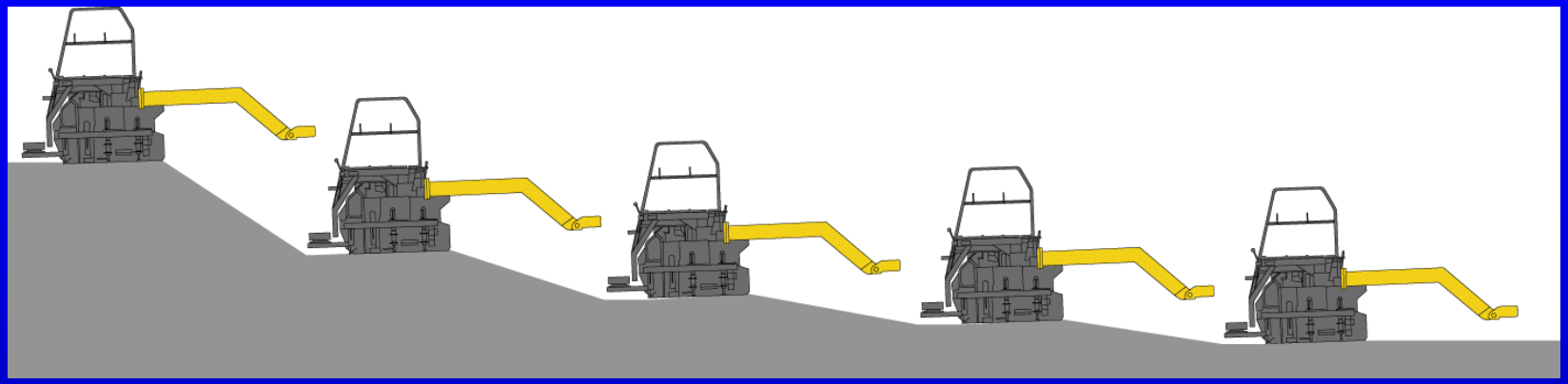
Stopping the Paver?

Sticking the Mat?



Direction of Paving

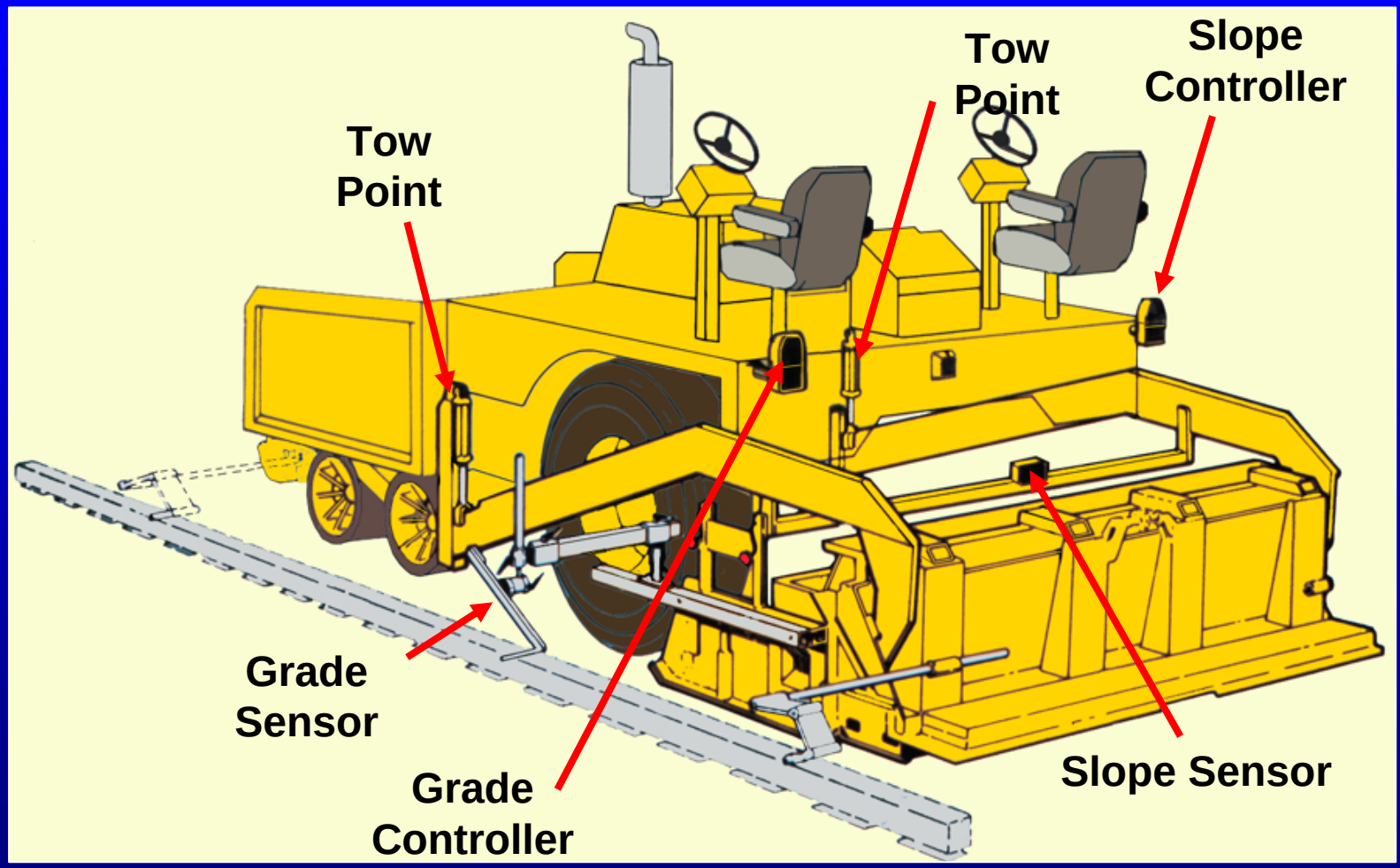
Screed Reaction Time



- Screed reacts to change in angle of attack over 5 tow arm lengths
- 65% of change occurs in the first tow arm length
- 35% of change occurs in the last 4 tow arm lengths

Manual vs. Automatic Adjustments

Grade and Slope Control



Types of Grade Reference

- Stringline
- Mobile reference
- Joint matching shoe
- Sonic sensor
- Laser

Stringline

Bridge Ski

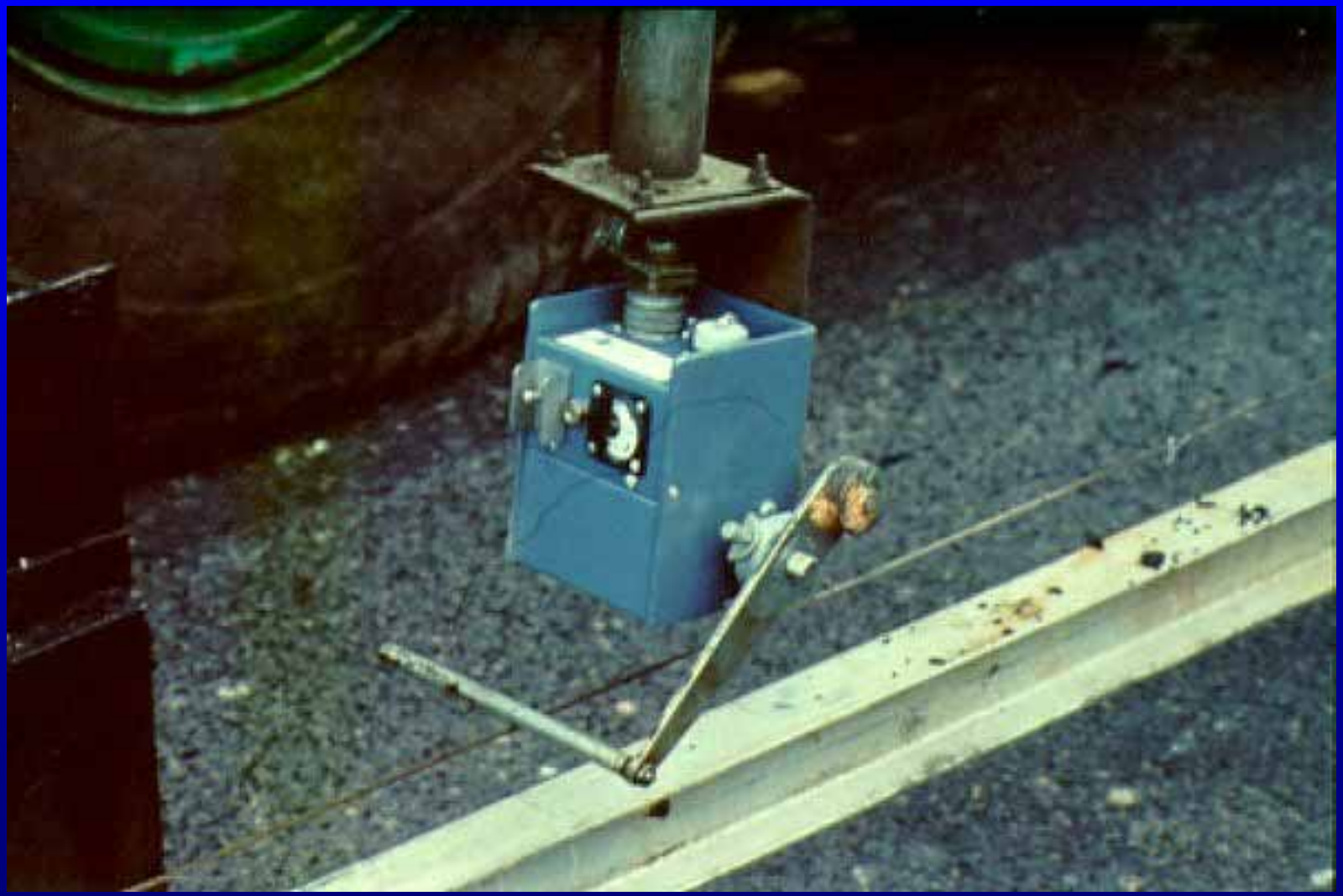
Floating Beam

Contact-less Beam with Four Ultra Sonic Sensors

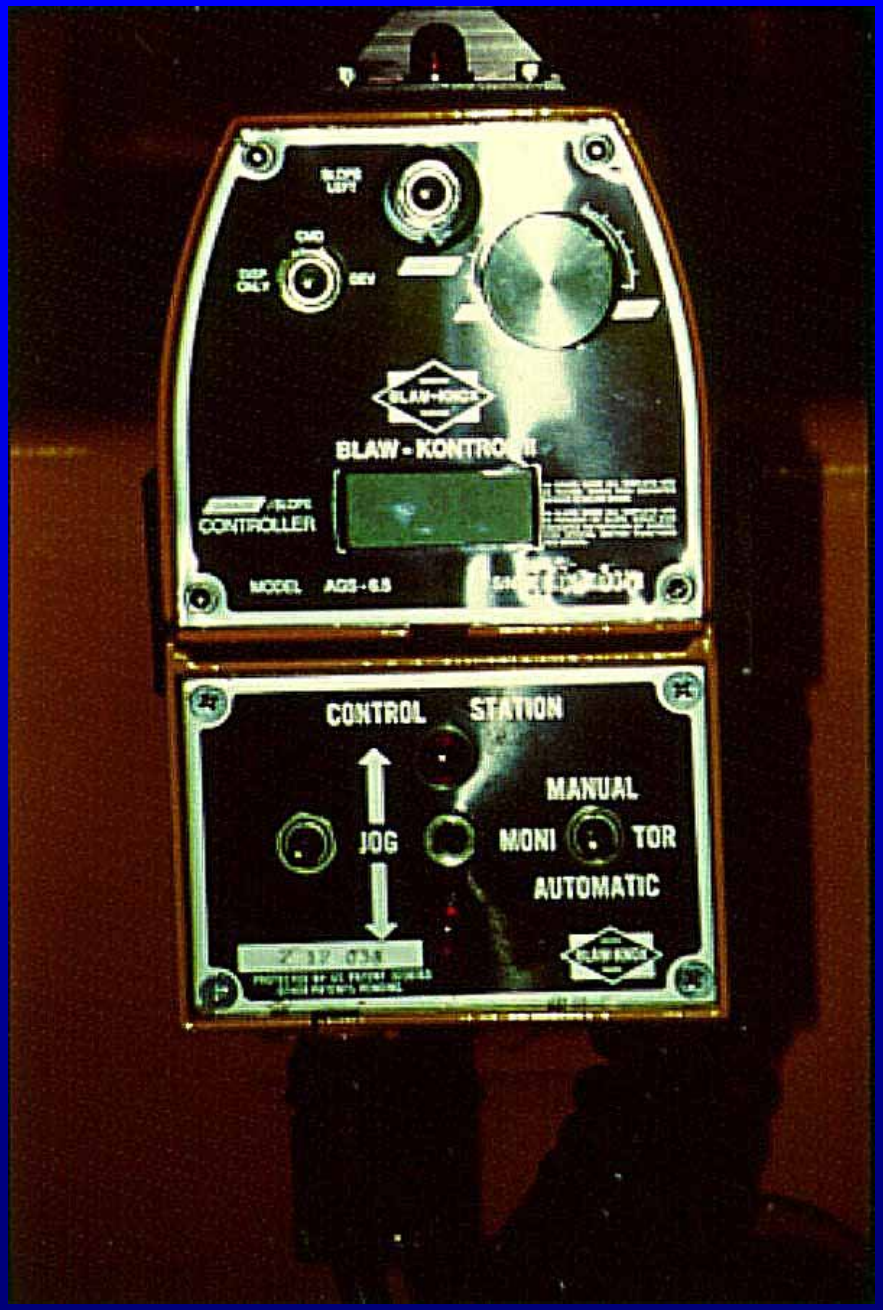
Courtesy of Blaw-Knox Ingersoll Rand Paving Products

Joint Matching Shoe

Automatic Grade Sensor



Automatic Slope Control

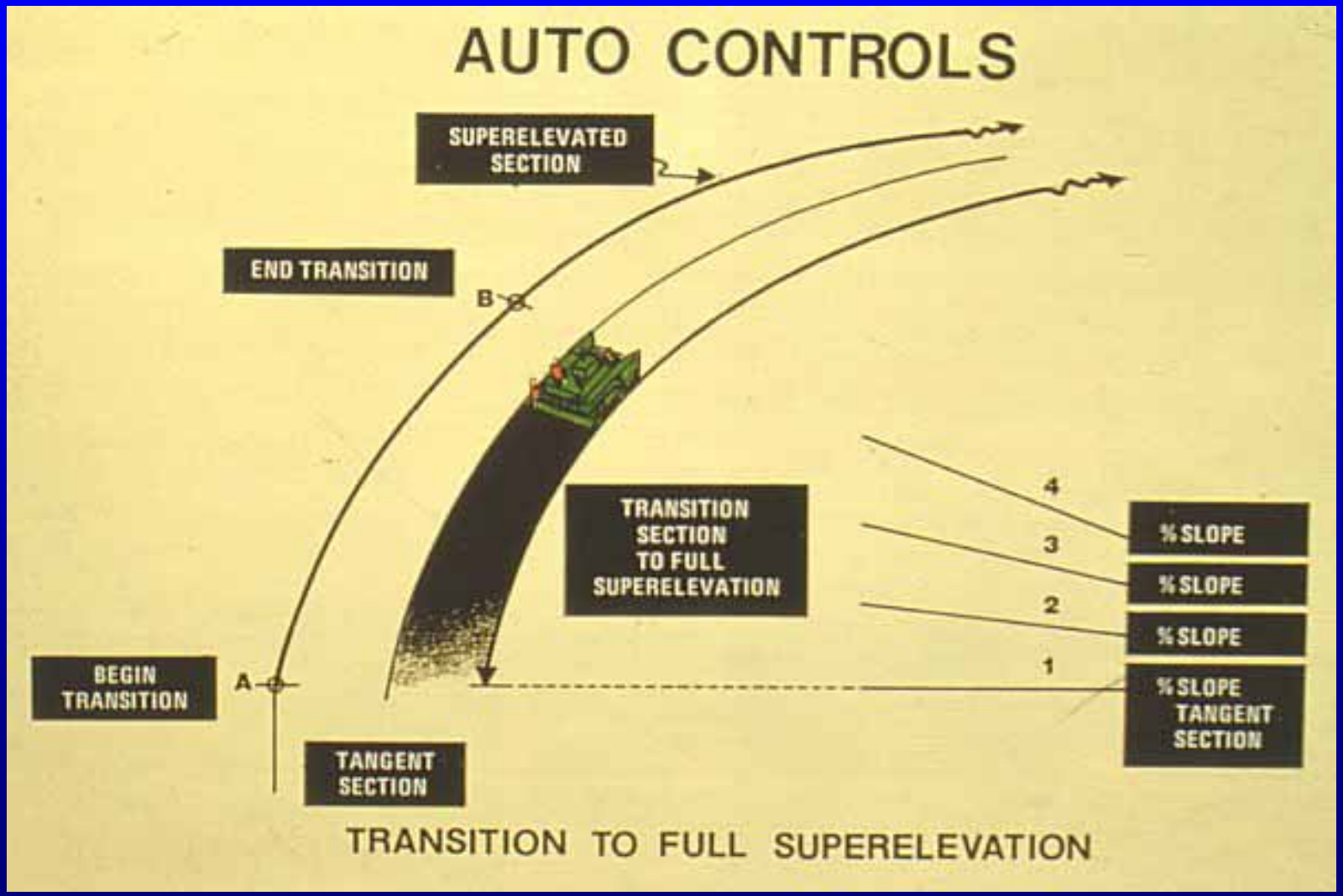


Automatic Grade Control

Automatic Slope Controller

Courtesy of Blaw-Knox Ingersoll Rand Paving Products

Automatic Slope Control



Paving Widths

- Final Joint Location
- Multiple Lifts

Good Joint Location?

Night Paving

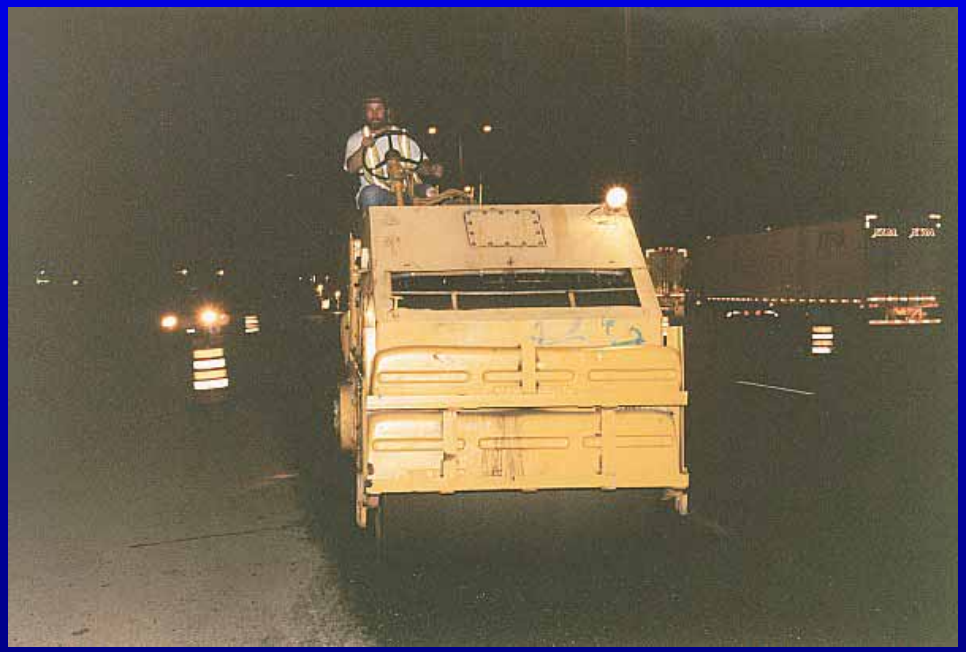
Night Paving

- More common
- Requires more attention
- Issues:
  - Visibility
  - Cooler Temperatures
  - New Crews
  - Lighting

Night Paving-Safety Issues

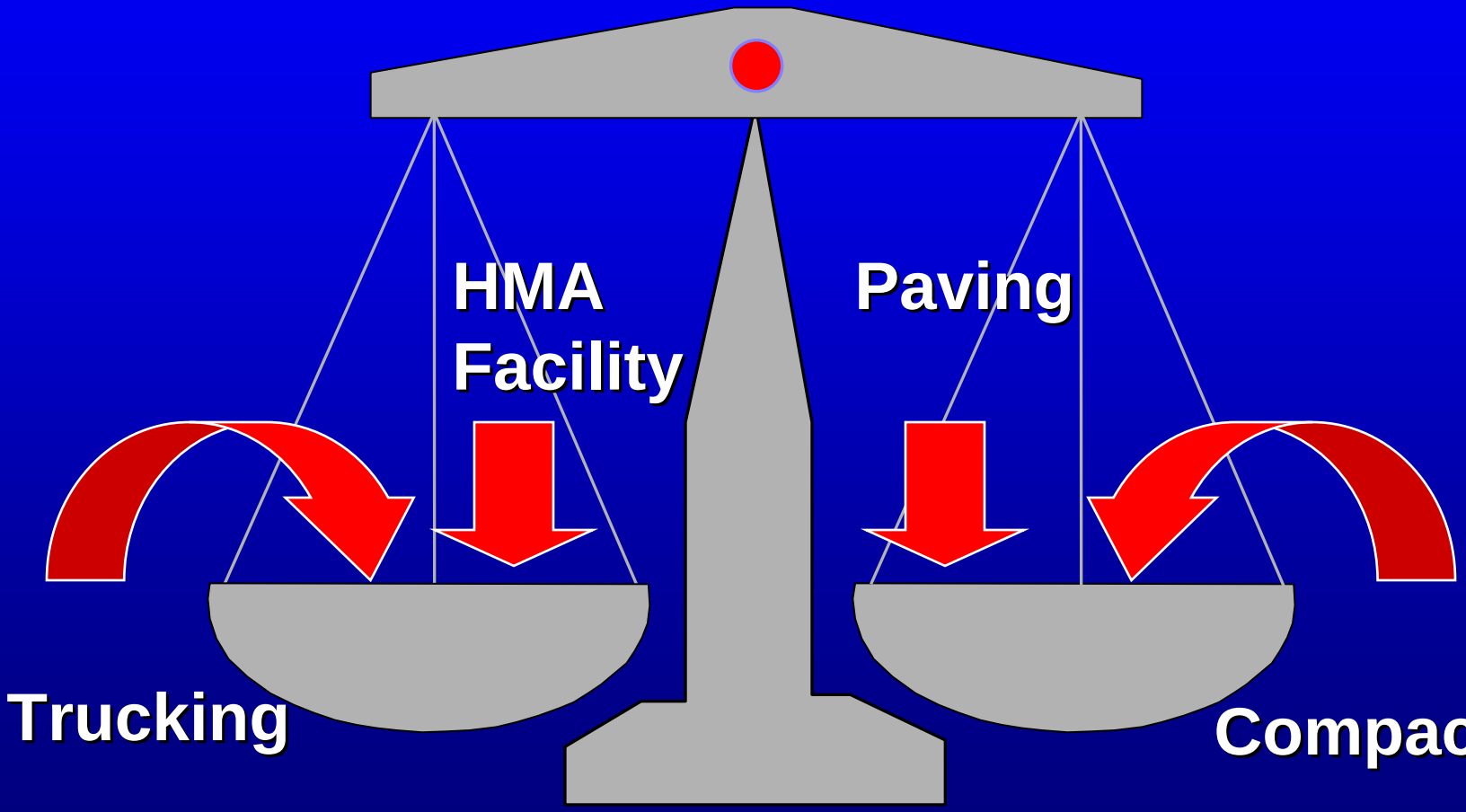
- Changes in Driving Habits
- Drunk drivers

Night Paving - Construction Issues



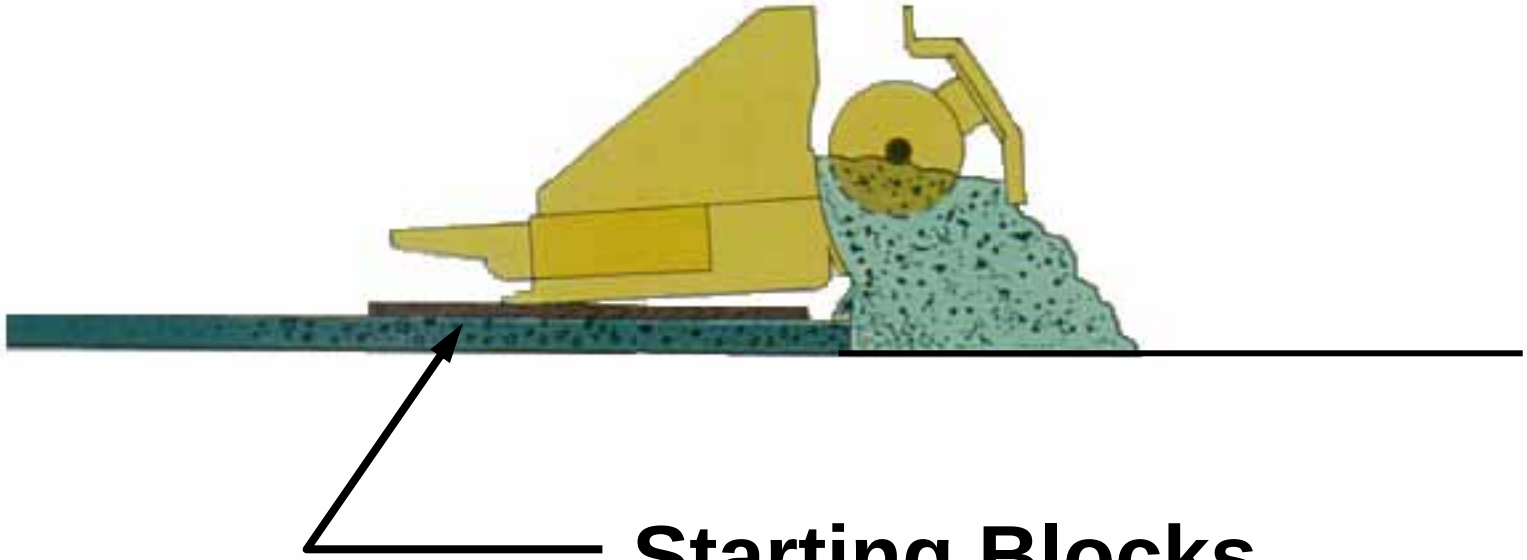
- Operator Awareness
- Equipment Maintenance
- Additional care during testing
- Impacts of limited lighting

Balancing Production

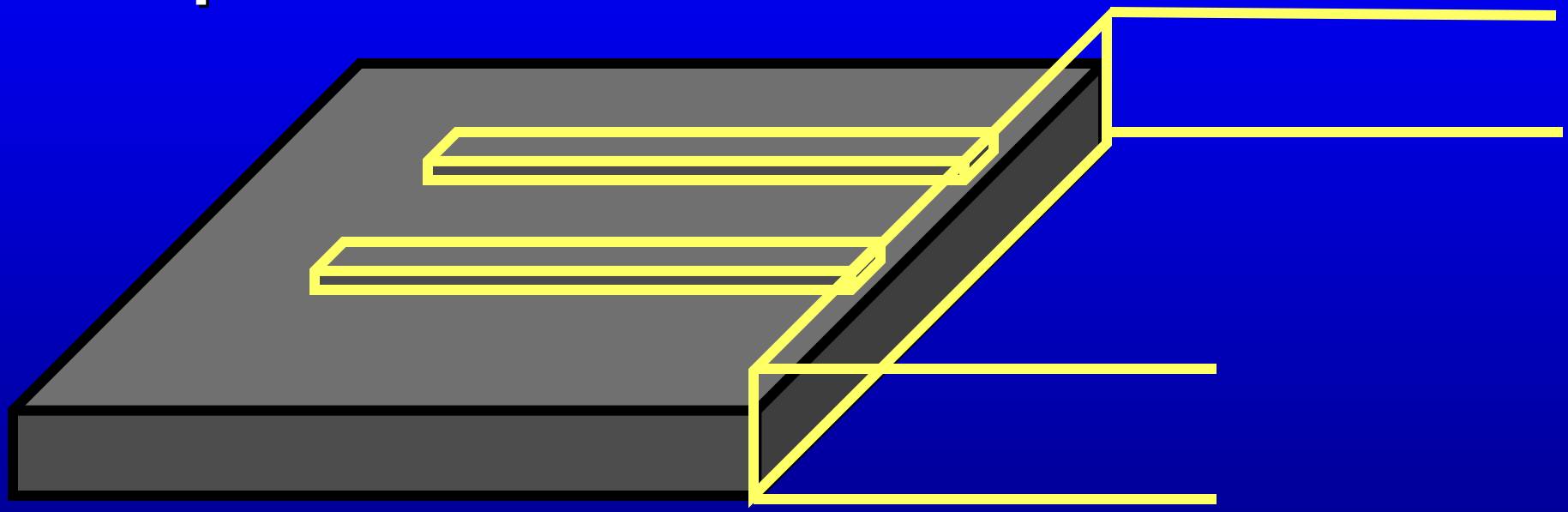


Warming Up

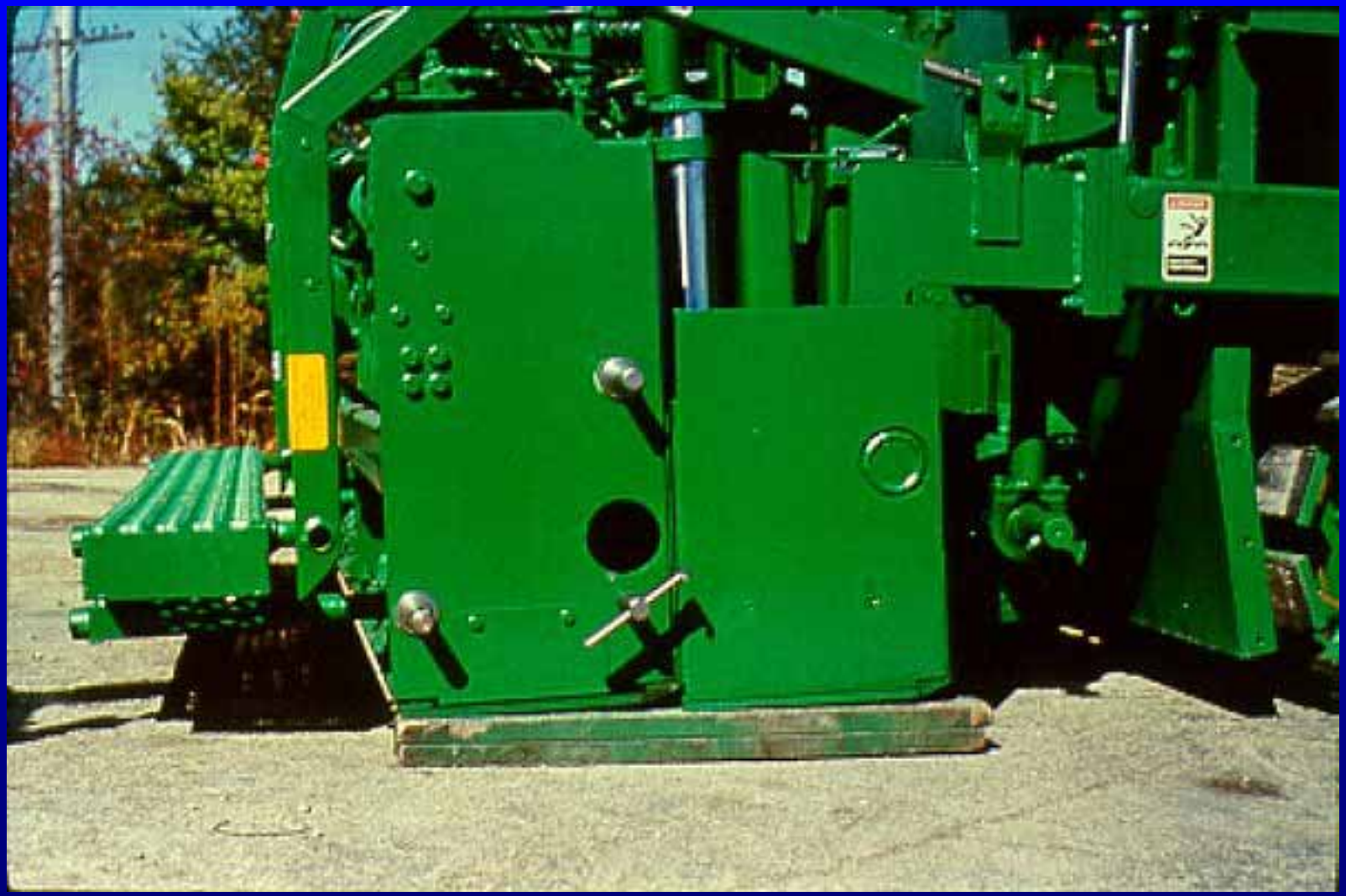
Screed in Position



A good rule of thumb is to raise the screed 20% to 25% more than the compacted thickness.



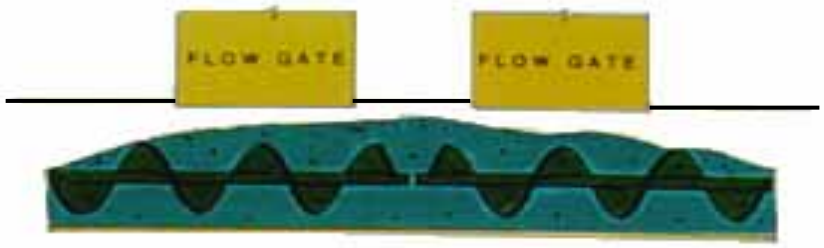
Setting Angle of Attack



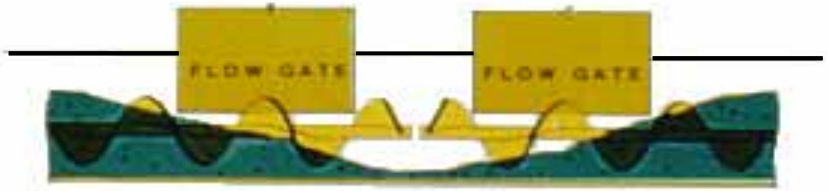
Misaligned Screed Extension

Courtesy of Blaw-Knox Ingersoll Rand Paving Products

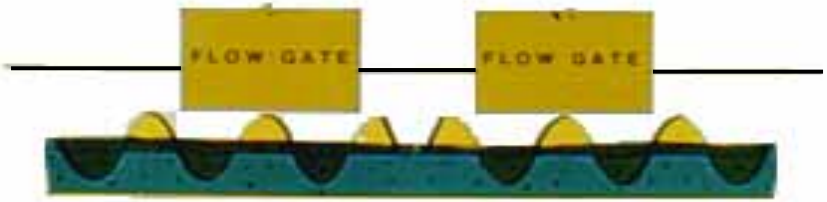
Adjust Flow Gates



Gates too HIGH - augers overloaded



Gates too LOW - insufficient material supply



Correct adjustment - uniform material volume/flow

Start Up

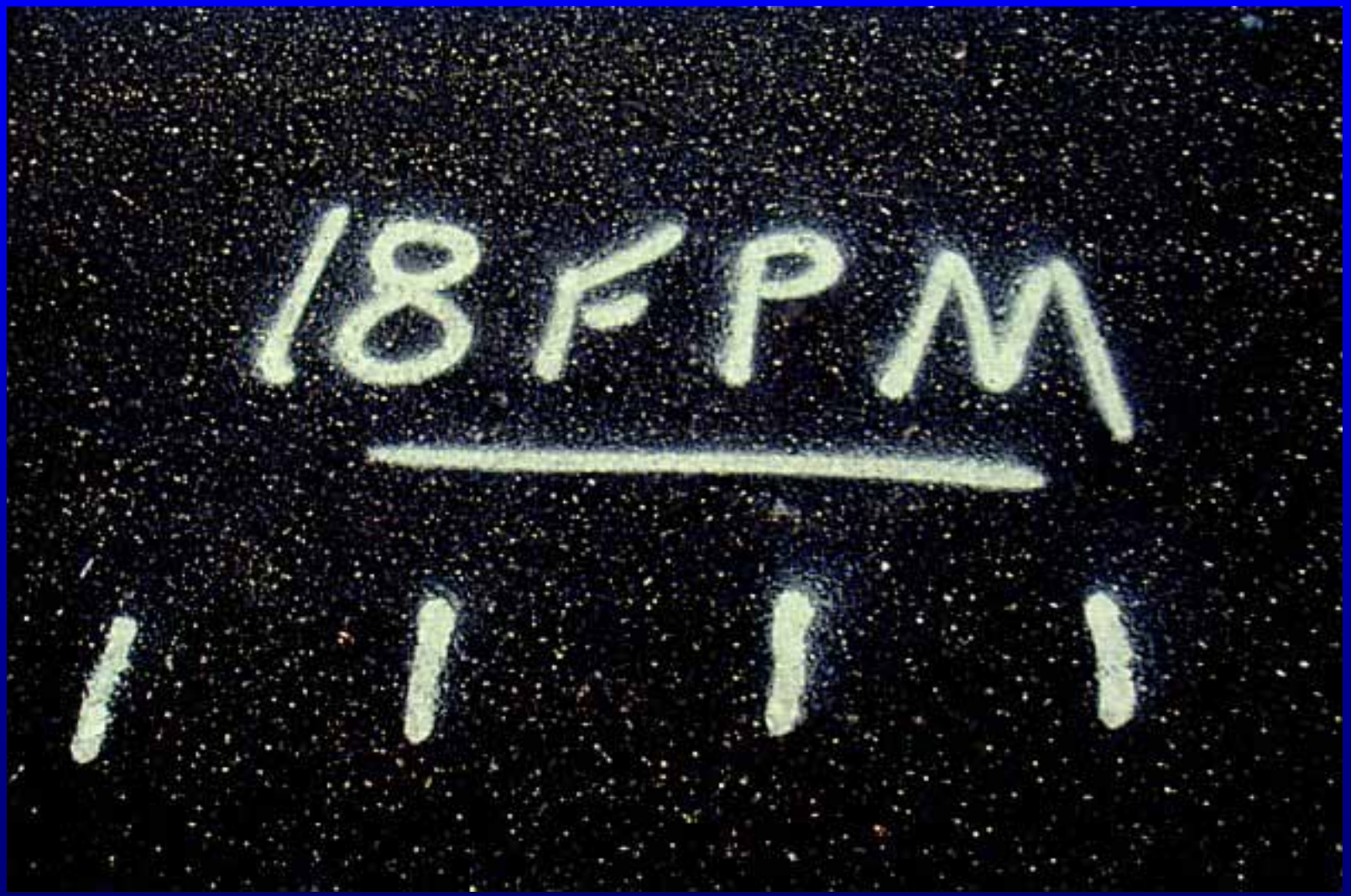
Re-Check Settings

- Is thickness okay?
- Is cross slope okay?
- Is mat texture okay?

Check Settings

Check Thickness And Head of Material

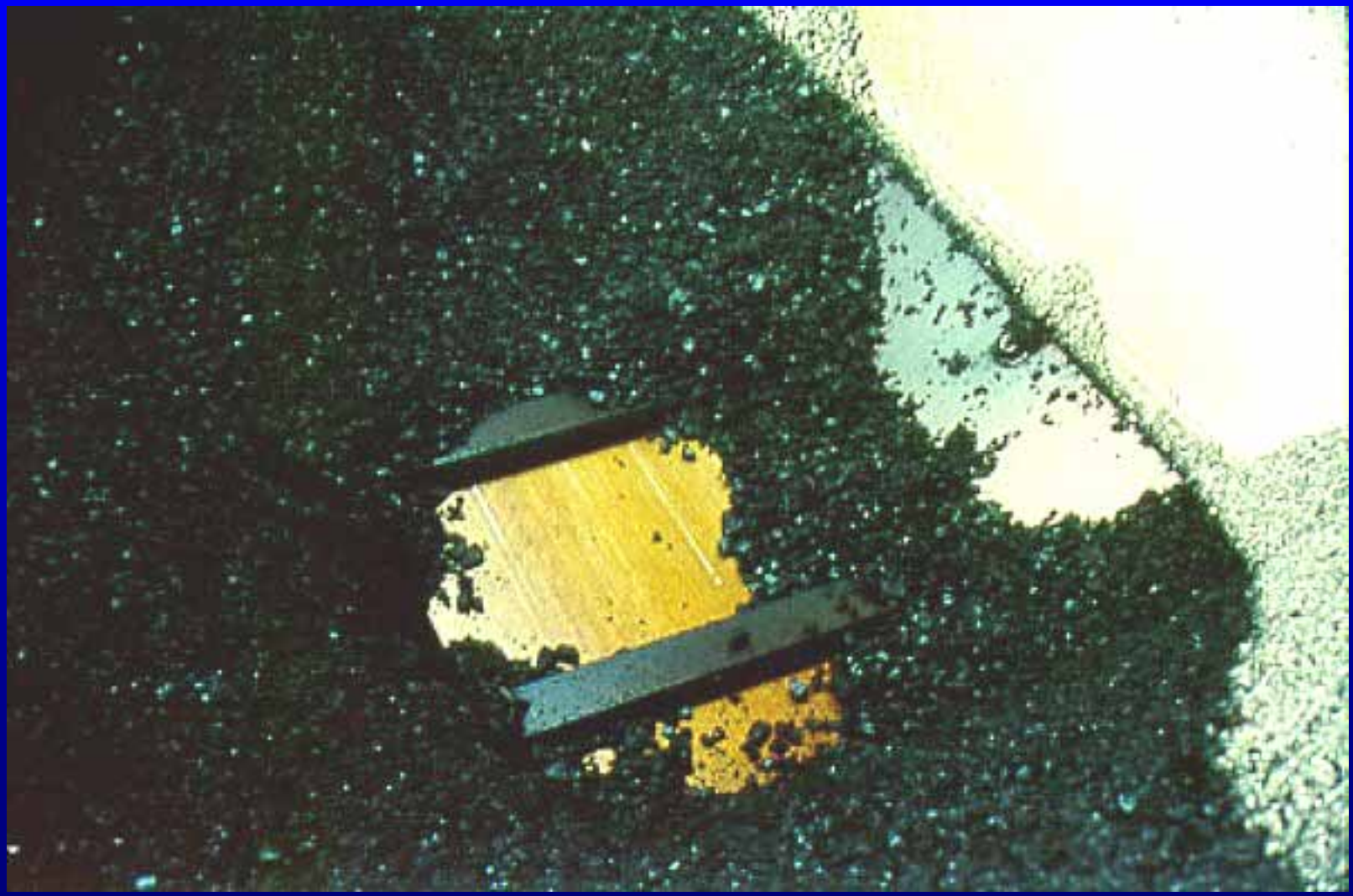
Check Paver Speed



Check Yield Periodically

Fold the Wings?

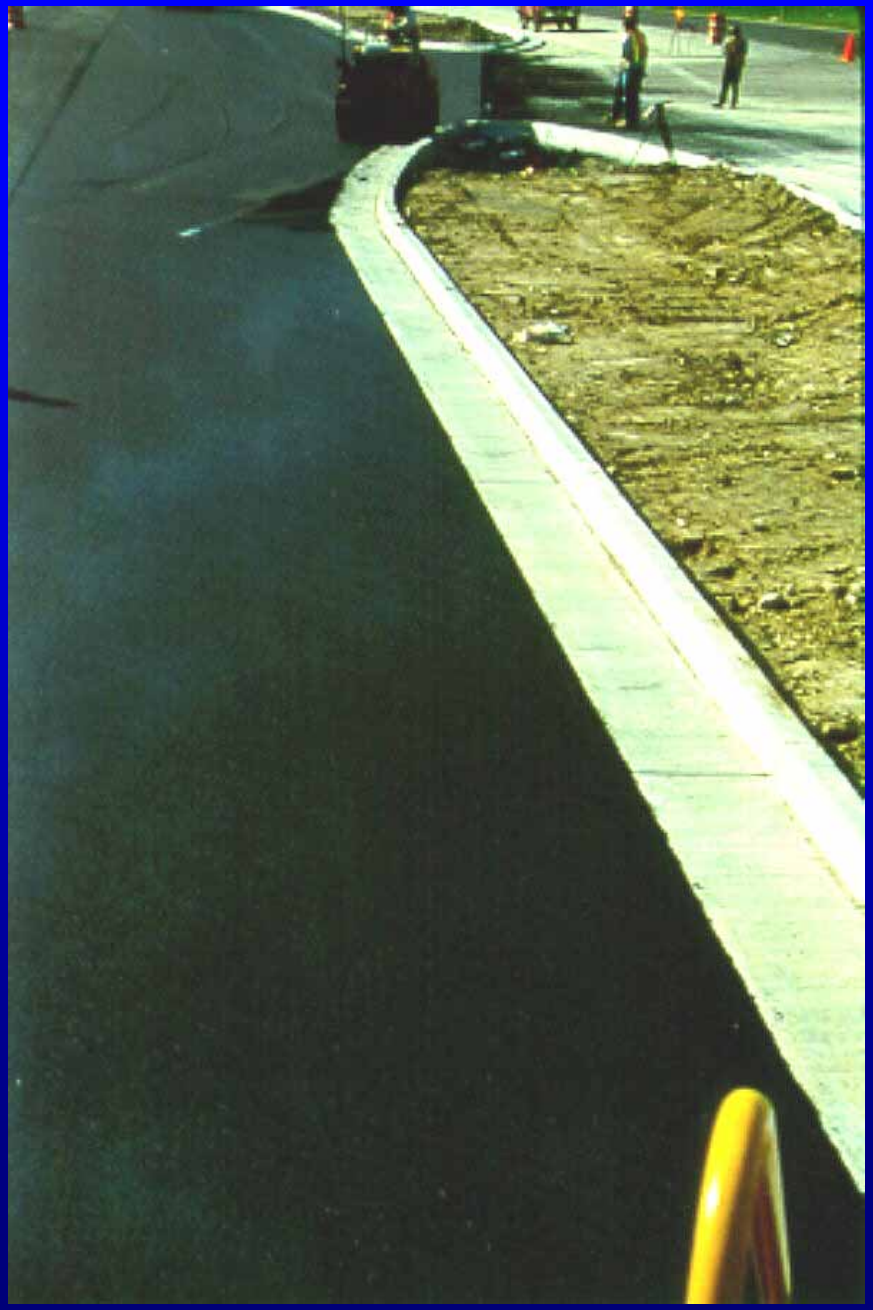
Don’t Let This Happen!



Next Truck Not Ready?

Constant Head of Material

Minimal Luting



Minimal Luting

Paver Maintenance

- Washing down
- Wear check
- Storage of electrical equipment
- Checklists

Questions???